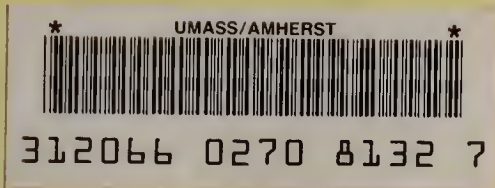


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Clearing the Air:

Massachusetts' Implementation of the Clean Air Act

Monday, October 26, 1992

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"Clearing the Air" Conference

Monday, October 26, 1992

Good afternoon, everybody.

I want to thank all of you for your attendance and participation today as we discuss the implications of the Clean Air Act Amendments and the philosophy that we have embraced to comply with its requirements.

The ink was barely dry on the new Clean Air Act when Paul Cellucci, Sue Tierney, and I took office back in January of 1991. I think it is safe to say that while the Clean Air Act of 1990 is one of the most profound and far-reaching pieces of environmental legislation ever passed in this country, it also is almost mind-numbingly complex.

Trying to figure out all its requirements and regulations is like trying to solve that old Rubik's Cube puzzle if you are color-blind.

Fortunately, Sue Tierney and her staff at the Executive Office of Environmental Affairs are pretty good cryptographers, and our administration has made compliance with the Clean Air Act Amendments a cornerstone of our environmental program. The progress Massachusetts makes in cleaning its air over the next six to eight years will likely be one of the key measures by which the success of our administration will be judged, and we intend to stay ahead of the curve in this effort.

Having said this, I think it worth repeating a fundamental belief I have stated many times before -- as someone who describes himself as being as "green" on environmental issues as I am pro-business on economic issues, I firmly hold to the conviction that the environment and the economy are not inherently in conflict with one another.

In fact, the economy and the environment are mutually dependent. A sound environment is one of the first causes that will keep highly skilled, highly mobile people here to work and live. People want to establish their families -- and their companies -- in a state and region with clean air, clean water, and accessible beaches. A clean environment has definite economic value, and that value is reflected in the choices people make.

The Clean Air Act Amendments put the nation squarely on track to tackle the numerous environmental and public health threats stemming from various forms of air pollution, such as: ground-level ozone, aka smog; carbon monoxide; acid-rain causing sulphur dioxide; air toxics; and CFCs and other stratospheric-ozone-depleting chemicals.

As you heard this morning [from American Lung/Massachusetts], the health-care cost-burden caused by air pollution is in the billions of dollars. Swift attainment of the Clean Air Act Amendments will help restore not only our environment and public health, but also our nation's economic competitiveness, by reducing air pollution's significant contribution to the rising health care

costs which are sapping all of us.

Additional economic and quality-of-life benefits will be realized under the Clean Air Act Amendments by reducing the destructive toll air pollution wreaks on our natural resources. Acid deposition in our lakes, rivers and streams can kill plant and animal life; air pollution can reduce productivity of our agricultural industry; and nitrogen depositions in our coastal waters -- 25 percent of which come from air pollution -- can cause algal bloom.

As important as clean air is, it must be obtained in a thoughtful, creative and cost-effective manner that relies wherever possible on market-based approaches, rather than upon traditional regulatory "command and control."

Much to the credit of President Bush and his environmental policy-makers, provisions for innovative, market-based solutions were engineered into the Clean Air Act Amendments and have sparked a widespread and fundamental shift in environmental regulation which we embrace firmly in my administration. I commend Bill Rosenberg and EPA Administrator Bill Reilly for the announcement just a few minutes ago on final acid rain regulations that rely on market allowances to cut SO₂ (S-O Two) emissions by 50 percent.

Here in Massachusetts, the Department of Environmental Protection will soon release a draft proposal to establish an emissions-reduction credit system that will provide meaningful economic incentives for industry -- on a completely voluntary

Gov. William F. Weld
Clean Air Act "Clearing the Air" Conference
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basis. This proposal encourages everyone involved to go beyond pollution-control requirements and make room in our "airshed" for new industries that are vital to our economic development.

Down the road, we hope that emissions-reduction credits will have even broader application in our State Implementation Plan, and facilitate our cleaning the air faster, more cost-effectively and with less bureaucratic entanglement.

"Smart" implementation strategies, such as these emissions reduction credits, are essential for Massachusetts because our economic base cannot withstand reckless or ill-conceived air pollution remedies. For example, the electric utility industry in New England, which will bear a heavy compliance burden under the Clean Air Act Amendments, already imposes rates on residential consumers and industry that are among the highest in the nation.

We must harness and pursue vigorously the cost-effective emissions reductions available through energy efficiency programs. The beauty of energy conservation is that not only does it reduce air pollution, but it also reduces business operating costs, making our economy more competitive.

Conservation programs also have the added advantage of creating hundreds, even thousands of skilled, local jobs while keeping some of our energy dollars from being exported. So this is an economic and environmental win-win.

On the supply side, it makes sense for utility companies to evaluate the economic opportunities to retire old, inefficient and

highly polluting plants in favor of newer, cleaner, and more-efficient combined-cycle and co-generation technologies.

Motor Vehicles, as you've heard today, are a major part of the air pollution problem, and we simply must address this sector to achieve our Clean Air Act Amendments goals. Our strategy here in the Commonwealth relies on a combination of cleaner fuels, cleaner cars, and transportation-demand management -- such as encouraging ridesharing, transit use, and congestion mitigation.

We've already made noteworthy progress. The Central Artery-Third Harbor Tunnel, for example, is one area where we should realize substantial environmental benefits in terms of demand management, improved traffic flow, and the public transit improvements which accompany the project.

I'm also particularly pleased that Massachusetts' adoption of the California Low Emissions Vehicle Program, beginning in model year 1995, is being followed in New York and is expected very soon in New Jersey and Maine, with other states likely to follow thereafter.

We also were the first state in the region to sign on to the reformulated gas program. Starting in 1995, the gas sold here in Massachusetts will create 15 percent less smog than the current version. And we'll be looking at phase two reformulated gas standards which can cut the smog-production by 25 percent by the year 2000. I'll note that since we signed onto the reformulated

gas idea almost a year-and-a-half ago, every other New England state has since climbed on board.

The recently passed National Energy Policy Act also provides major federal support to facilitate our transition to the clean car program and enhances the benefits we expect to obtain in this area.

The initiatives we are undertaking in moving to the next generation of clean cars and encouraging technological innovation will produce more than just cost-effective emissions reductions: Massachusetts has already established itself as a desirable location for clean car research, development and manufacturing.

Some of the notable players in this market area include Solectria, a manufacturer of electric cars in Wilmington; Tecogen, a subsidiary of Thermo-Electron in Waltham that makes natural-gas powered engines; and Electric Vehicles of America, a Maynard-based electric car conversion company.

These are the sort of knowledge-intensive companies in emerging environmental technologies that are of prime interest in our economic development plans. We've also got some satisfied customers right here in state government. Sue Tierney is currently driving an electric car from Solectria, and Energy Commissioner Steve Remen has inherited her compressed-natural gas car. (I thought I saw one of them parked out front, if anyone wants to go joyriding later.)

Thanks to funding from the Intermodal Surface Transportation Efficiency Act, the Division of Energy Resources and the Boston

Metropolitan Planning Organization, with assistance from North East States for Coordinated Air-Use Management, will soon embark on a demonstration program that will put 50 electric vehicles on the road over the next few years. And charging facilities will be developed at commuter rail and subway links to ensure that cleaner cars help to reduce road congestion into downtown areas.

The state has also taken the initiative in several other areas. We hold ourselves to the same standards that we have for the private sector in terms of reducing pollution, and, preferably, preventing pollution in the first place. This attitude is based on the firm conviction that it is far more cost-effective to prevent environmental problems than pay for after-the-fact cleanup.

Towards this end, Massachusetts has signed on to the EPA's Green Lights initiative, which will result in a comprehensive evaluation and installation of energy-efficient lighting shown to be cost-effective. Prior energy conservation improvements in over 70 state facilities have resulted in more than \$8 million in annual savings. Over the next two years, the Commonwealth plans to improve lighting efficiency in over 11-million square feet of state buildings.

As Chairman of the Coalition of Northeastern Governors, I have also placed at the top of that organization's environmental agenda the role of energy efficiency approaches in the context of the Clean Air Act Amendments. CONEG's major initiatives for the upcoming year will relate to using energy efficiency programs as a

means of developing emissions reductions offsets that will allow for new economic growth.

And last Monday I attended a CONEG-sponsored Biofuels conference here in Boston, where several alternatives to reduce our dependence on air-polluting fossil fuels were discussed.

Here in New England we've also undertaken a regional transportation study focused on intermodal transportation. I'll note that both our transportation and our environmental secretaries sit on this panel. With the advent of the Clean Air Act Amendments, the Intermodal Surface Transportation Efficiency Act, and the new National Energy Policy Act, transportation, energy, and environmental policies and programs undeniably are now more interdependent than ever. They cannot operate in isolation, and we're making sure they work cooperatively here in Massachusetts.

Along these lines, Energy Commissioner Remen is developing a new state energy plan that will emphasize the connection between energy, the environment, and transportation and will detail strategies that make sure our energy needs are met in an environmentally sound manner.

(Wrap Up)

All these measures I've mentioned adhere to some of the guiding principles we have for our Clean Air Act strategy:

- ▶ establishing performance standards and market-based approaches so that businesses can determine their least costly means of compliance;

- ▶ making sure that our response has the least-costly effect possible on the Massachusetts economy;
- ▶ spreading the cost-burden equitably;
- ▶ having the lowest marginal cost of control;
- ▶ and building the broadest regional applicability to ensure that we do not create competitive disadvantages for employers here in Massachusetts.

As I said earlier, these are complex issues we are grappling with, but in the big picture we see the Clean Air Act Amendments as an opportunity to establish a more salutary climate in which to work and live.

Thank you.

Program

Clearing the Air: *Massachusetts' Implementation of the Clean Air Act*

Monday, October 26, 1992

Sponsored by the

Executive Office of Environmental Affairs

in conjunction with the

Northeast States for Coordinated Air Use Management

and co-sponsored by

The American Lung Association of Massachusetts

The Gordon Public Policy Center of Brandeis University

The New England Coalition for Clean Air

8:00 - 9:00 REGISTRATION

9:00 - 9:10 WELCOME

*Susan F. Tierney, Secretary of Environmental Affairs,
Commonwealth of Massachusetts*

9:15 - 9:40 THE CLEAN AIR ACT AMENDMENTS OF 1990

*Mr. William G. Rosenberg, Assistant Administrator, Air and
Radiation, U.S. Environmental Protection Agency*

9:40 - 9:50 CLEAN AIR: WHY IT MATTERS

*Barbara Hamelburg, Esq. Representative of the American Lung Association of
Massachusetts*

9:50 - 10:10 SHAPING THE STATE RESPONSE

Secretary Susan F. Tierney

**10:10 - 10:45 MASSACHUSETTS' AIR QUALITY AND THE
REGULATORY PROCESS**

*Daniel Greenbaum, Commissioner of the Massachusetts
Department of Environmental Protection*

**10:45-11:00 INTERSTATE COOPERATION AND THE OZONE
TRANSPORT COMMISSION**

*Bruce Carhart, Executive Director,
Ozone Transport Commission*

11:00- 11:45 PANEL DISCUSSION

QUESTIONS AND ANSWERS

11:45-12:45 LUNCH

**1:00 - 1:20 BALANCING ENVIRONMENTAL QUALITY AND
ECONOMIC GROWTH**

Governor William F. Weld

1:20 - 1:30 INTRODUCING THE AFTERNOON SESSION

Secretary Susan F. Tierney

1:30 - 2:40 **STATIONARY AND AREA SOURCES**

**Industry and Manufacturing
The Regulatory Perspective**

Thomas Powers, Deputy Commissioner, Department of Environmental Protection

The Industry Experience

Paul Wallach, Senior Partner, Hale and Dorr

**Electric Power Industry
Regulatory Perspective**

*Laurel Carlson, Deputy Director, Division of Air Quality Control,
Department of Environmental Protection*

The Industry Experience

Mr. Frank Lee, Manager of Environmental Affairs, Boston Edison

2:40 - 3:15 **MOBILE SOURCES**

The Legislative Perspective:

Representative David B. Cohen

Transportation Systems Planning

*Buzz Constable, Assistant Secretary, Executive Office of Transportation
and Construction*

Transportation Control Technology

Michael Walsh, Freelance Consultant

3:15 - 3:30 **NEW SOURCE REVIEW AND MAXIMUM ECONOMIC
GROWTH: A Market-based Program**

Secretary Susan F. Tierney

3:30 - 4:00 **QUESTIONS AND ANSWERS**

4:00 - 4:30 **WRAP-UP**

Commissioner Greenbaum and Secretary Tierney

4:30 - 5:00 **Informal Reception**



Acid Rain Program Environmental Benefits

In order to reduce acid rain in the United States and Canada, Title IV of the Clean Air Act Amendments of 1990 established the Acid Rain Program. The program will cut sulfur dioxide emissions in half and substantially reduce nitrogen oxides emissions from electric utility plants. This fact sheet discusses the environmental effects of acid rain and the benefits that will accrue as a result of the required emissions reductions, and is one of a series containing information about the program.

Acidic deposition, or acid rain as it is commonly known, occurs when chemically laden emissions react in the atmosphere with water, oxygen, and oxidants to form various acidic compounds. These compounds then fall to the earth in either dry form (such as gas and particles) or wet form (such as rain, snow, and fog).

Sulfur dioxide (SO_2), which is emitted primarily by coal-burning electric power plants, is the dominant precursor of acid rain in the United States. Emissions of nitrogen oxides (NO_x) also play a role in the formation of acid rain and are significant in the formation of ground-level ozone.

Electric utility plants account for about 70 percent of annual SO_2 emissions and 30 percent of NO_x emissions in the United States. Over 20 million tons of each of these two pollutants are emitted into the atmosphere each year.

Acid rain causes surface water acidification and damages trees at high elevations (for example, red spruce trees above 2,000 feet in elevation). Air concentrations of sulfur and nitrogen species degrade visibility in large parts of the country, including our national parks.

In addition, acid rain accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage. Finally, air concentrations

of acidic aerosols (tiny droplets of sulfuric acid derived from SO_2 emissions) may pose a risk to public health.

Implementation of the acid rain provisions will confer significant benefits on the nation. Acid rain control will allow acidified lakes and streams to recover so that they can once again support fish life. Visibility will improve, allowing for increased enjoyment of scenic vistas across our country. Acid rain control will improve the health of forests, particularly red spruce forests that populate the ridges of mountains from Maine to Georgia. It will provide new safeguards for our nation's cultural heritage through protection of historic buildings and monuments, and it will provide an insurance policy against the potential threat to public health posed by acidic aerosols.

Surface Waters

Acid rain primarily affects sensitive bodies of waters, that is, those that rest atop soil with a limited ability to neutralize acidic compounds (called "buffering capacity"). Many lakes and streams examined in a National Surface Water Survey (NSWS) suffer from chronic acidity, a condition in which water has a constant low pH level. The NSWS investigated the effects of acidic deposition in over 1,000 lakes larger than 10 acres and in thousands

of miles of streams thought especially sensitive to acidification. Of the lakes and streams surveyed in the NSWS, acid rain has been determined to cause acidity in 75 percent of the acidic lakes and about 50 percent of the acidic streams.

In some sensitive lakes and streams, acidification has completely eradicated fish species, such as the brook trout, leaving these bodies of water barren. In fact, hundreds of the lakes in the Adirondacks surveyed in the NSWS have acidity levels indicative of chemical conditions unsuitable for the survival of sensitive fish species.

Emissions from U.S. sources contribute to acidic deposition in Canada. The soil in eastern Canada is very similar to the soil of the Adirondack Mountains. Lakes in eastern Canada are consequently extremely vulnerable to chronic acidification problems. The Canadian government has estimated that 14,000 lakes in eastern Canada are acidic.

Streams flowing over soil with low buffering capacity are equally as susceptible to damage from acid rain as lakes are. Approximately 580 of the streams in the Mid-Atlantic Coastal Plain* are acidic primarily due to acidic deposition. The New Jersey Pine Barrens area endures the highest rate of acidic streams in the nation with over 90 percent of the streams acidic. Over 1,350 of the streams in the

*The Mid-Atlantic Coastal Plain encompasses parts of the Piedmont and coastal plain in New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and North Carolina. The Mid-Atlantic Highlands extend from southeastern New York through most of Pennsylvania and include portions of Maryland, West Virginia, and Virginia. The Mid-Appalachians include Virginia, West Virginia, Maryland, Pennsylvania, and North Carolina.



Mid-Atlantic Highlands are acidic, primarily due to acidic deposition, while streams in the Mid-Appalachians are also undergoing increasing acidification. Many streams in that area have already experienced trout losses due to the rising acidity.

Acidification is also a problem in areas that were not surveyed in federal research projects. For example, although lakes smaller than 10 acres were not included in the NSWS, there are from one to four times as many of these small lakes as there are larger lakes. In the Adirondacks, the percent of acidic lakes is significantly higher when it includes smaller lakes (26 percent) than when it includes only the NSWS target size lakes (14 percent).

The acidification problem in both the United States and Canada grows in magnitude if "episodic acidification" (brief periods of low pH levels from snowmelt or heavy downpours, which can result in fish kills) is taken into account. Lakes and streams throughout the United States, including western lakes, are sensitive to episodic acidification. In the Mid-Atlantic Highlands, the Mid-Atlantic Coastal Plain, and the Adirondack Mountains, about three times as many lakes and streams become temporarily acidic during storms and snowmelt.

Acid rain control will produce significant benefits in terms of lowered surface water acidity. If acidic deposition levels were to remain constant over the next 50 years (the timeframe used for projection models), the acidification rate of lakes in the Adirondacks that are larger than 10 acres would rise by 50 percent or more. Scientists predict, however, that the decrease in SO₂ emissions required by the Acid Rain Program will virtually eliminate emission-caused acidification in that area.

Forests

Acid rain contributes to forest degradation, especially in high-elevation spruce trees that populate the ridges of the Appalachian Mountains from Maine to Georgia, including national park areas such as the Shenandoah and Great Smokey Mountains national parks.

Acidic deposition seems to impair the trees' growth in several ways; for example, acidic cloudwater at high elevations increases the susceptibility of the red spruce to winter injury.

There also is a concern about the impact of acid rain on forest soils. There is good reason to believe that long-term changes in the chemistry of some sensitive soils may have already occurred as a result of acid rain. As acid rain moves through the soils, it can strip away vital plant nutrients through chemical reactions, thus posing a threat to future forest productivity.

Visibility

Sulfur dioxide emissions lead to the formation of sulfate particles in the atmosphere. Sulfate particles account for more than 50 percent of the visibility reduction in the eastern part of the United States, affecting enjoyment at many of our national parks. The legislated reduction in SO₂ emissions is expected to result in a 30-percent increase in visual range in the eastern part of the country. In the western part of the United States, nitrogen and carbon also play roles, but sulfur has been implicated as an important source of visibility impairment in many of the Colorado River Plateau national parks, including the Grand Canyon, Canyonlands, and Bryce Canyon.

Building Materials

Acid rain is known to contribute to the corrosion of metals and deterioration of stone and paint in buildings, statues, and other structures of cultural significance. The damage inflicted on cultural objects, such as statues or historic monuments, proves especially costly since a loss of detail caused by the corrosive potential of acid rain seriously depreciates the objects' value to society. Dry deposition of acidic compounds can also dirty buildings and other structures, leading to increased maintenance costs. Given the very large number of buildings affected by wet and dry deposition, even a small impact on maintenance costs could translate into a very large savings to society.

Health

High levels of SO₂ have been proven to cause or aggravate various types of lung disorders. These lung disorders, which affect a person's ability to breathe, have led to both increased morbidity (sickness) and mortality. Based on these concerns, SO₂ has historically been regulated under the Clean Air Act.

Additionally, studies at Harvard University have suggested a relationship between acidic sulfate (a type of acidic aerosol) levels and increased levels of morbidity and mortality. While EPA continues to study the problem, SO₂ emission reductions under the Acid Rain Program will reduce sulfate levels in the atmosphere, thereby providing an insurance policy against this threat to public health.

Clean Air for a Better Life

By reducing SO₂ emissions by such a significant amount, the Clean Air Act promises to confer numerous benefits on the nation. Scientists project that the 10 million-ton reduction in SO₂ emissions should significantly decrease the acidification of water bodies and damage to forests and even allow these processes to be reversed. In addition, visibility will be significantly improved due to the cutbacks, and the lifespan of buildings, materials and structures of cultural importance should lengthen. Finally, the reductions in emissions will help to protect public health.

For More Information

Write to:

U.S. EPA

Acid Rain Division (6204J)

401 M Street, SW.

Washington, DC 20460

If you would like to receive other fact sheets on the Acid Rain Program, call the Acid Rain Hotline at 617-674-7377 or the EPA Public Information Center (PIC) at 202-260-2080.

Clearing the Air Conference Evaluation Form

Please help us to evaluate this conference and to plan future events.

- 1) Do you feel that you know more about the Clean Air Act Amendments and the status of their implementation in Massachusetts?
- 2) Are there any topics about which you would like to have more detailed information? Please list them.
- 3) Do you have any suggestions for improvement?
- 4) What type of related events would you like to see the Executive Office of Environmental Affairs conduct in the future?
- 5) Would you like to be contacted for conferences on related issues? Please note area of interest and fill out the following:

Name:

Affiliation:

Address:

Phone #:

Fax #:

Address information is optional unless you wish to be contacted for future events.

Thank you for taking the time to give us your comments and suggestions.

Clearing the Air Conference: Implementing the Clean Air Act in Massachusetts ***A Progress Report*** October 1992

The passage of the Clean Air Act Amendments of 1990 marked the beginning of a new era in environmental protection. After 20 years of air quality regulations that fell short of attaining clean air, the 1990 Amendments were totally redesigned to require specific results, to track progress towards these results and to impose mandatory and meaningful sanctions for failure.

The U. S. Environmental Protection Agency is responsible for writing nearly two hundred new regulations and regulatory guidance documents. Most of these technically complex regulations, in turn, require Massachusetts to respond with new regulations or compliance strategies, and in some cases new laws. Many programs are specifically prescribed but there is also some flexibility for each state to develop its own programs.

With the foundations of the Act becoming increasingly clear, Massachusetts has been working hard to comply. The Commonwealth fully embraces the use of market-based approaches to provide incentives for environmental benefit and to give accurate price signals for the use of natural resources.

This progress report provides a brief summary of the strategies that Massachusetts is pursuing for fulfilling these requirements and provides you with a timetable so that you can participate in the strategic decisions which must be made.

The Goal of the Act

By 1999, all air pollution monitors in the state and areas downwind need to show that our air meets the national standards. The law specifically requires that we plan for and put in place programs to reduce smog-causing air pollutants by at least 24% (relative to 1990 smog levels). Then we must enact whatever additional steps are required to achieve compliance by 1999. As a "serious" non-attainment area under the law, there are many federally required actions which Massachusetts must undertake. We forecast these required programs will achieve about two thirds of the required 24% emissions reduction. The Commonwealth has latitude to choose our own specific actions for the remaining emissions reductions.

The Clean Air Act Milestone Requirements:

- November of 1992: an **Emissions Inventory** is due, showing where all of our existing pollution (from industry, transportation, natural sources

and consumer products) is generated. In addition, certain regulations are required: 1) a commitment to do some form of enhanced auto inspections and maintenance, 2) new source review (with emissions "offset" requirements) for new stationary sources (factories or plants), and 3) for existing plants and factories; "Reasonably Available Control Technology" (RACT) to reduce pollution from volatile organic compounds (VOCs) and oxides of nitrogen (NOx).

- November of 1993: the state must file a **State Implementation Plan (SIP)** to show how we will accomplish a 24% pollution reduction net of growth. The SIP must show how we plan to reduce emissions by 24% from 1990 levels, and additionally how we will compensate for any new sources of emissions we hope to attract to the state. In this plan, we will be committing ourselves to measures for implementation and making them federally enforceable.
- November of 1994: an **Attainment Demonstration** must be prepared for EPA showing proof (via computer modeling) that the programs in our state plan will produce air quality within national standards by 1999.
- November of 1996: Massachusetts' air pollution field monitors must actually show a **15% reduction in emissions levels**. If our field monitors show that air quality has not improved enough, we will automatically be ratcheted-up into a worse air quality category with added mandatory control requirements.

Program Requirements: At a minimum we must:

- Commit to enact a stricter automobile Inspection and Maintenance (I&M) Program (under discussion at the I&M Study Commission of the Massachusetts Legislature)
- Implement a Stage II Vapor Recovery System at filling stations (nearly done)
- Change the volatility of gasoline (complete)
- Establish an operating permit system (and a fee) for both existing and new facilities (power plants, factories, businesses) emitting over 50 tons per year (under regulatory development)
- Implement a system for offsetting emissions from new sources by 120% (and allow no large facility to receive an operating permit without 120% of its emissions offset somewhere else) (interim proposal Nov./Dec. 1992)

- Participate in the Ozone Transport Commission (on-going)
- Require reasonably available control technologies (RACT) for large NO_x (such as power plants) and VOC emitters (such as coating operations) (regulations proposed and under discussion). The NO_x RACT rules are controls on existing fossil fuel power plants. Over the decade, utilities will decide to bring their plants into compliance, including the possibility of fuel switching, repowering or plant closings.

We do not believe that these required measures will produce reductions sufficient to bring air quality to the national standards and to keep us in compliance, Massachusetts must come up with other programs to yield additional emissions reduction (at a minimum) of smog-causing pollutants. Towards this end, we have already made the following commitments:

- Low Emitting Vehicle (LEV) Program starting with car model year 1995.
- Reformulated Gasoline starting in January 1995
- Transit and HOV Commitments under CA/THT agreements

Certain of these measures are being packaged together into an Integrated Mobile Source Strategy, explained in the attached material.

Guiding Principles of Our Clean Air Act Strategy

After placing the mandatory measures into the SIP and implementing state laws or regulations, the Commonwealth must plan for and implement additional discretionary emissions reductions to prove (in computer models and on air monitors) that we've complied. We will use the following guiding principles to select those additional pollution control strategies which:

- ✓ Have the lowest marginal cost of control (\$/ton of emissions reduction),
- ✓ Cost the least to Massachusetts economy overall,
- ✓ Cost the least to administer, to implement and to monitor,
- ✓ Spread the cost burden equitably,
- ✓ Have the broadest regional applicability to prevent competitive disadvantages for Massachusetts businesses.
- ✓ Adopt a posture that Massachusetts cannot be for economic growth and transportation projects without also being for clean air. The Clean Air Act ties them all together: if our plans, computer model of plan results and actual air quality field monitors do not indicate compliance we will be liable to sanctions. These sanctions are a loss of federal highway dollars and a prohibition on issuing new operating permits for new businesses. Citizen lawsuit provisions give these sanctions real teeth.

- ✓ Use markets wherever possible to establish performance standards so that businesses can determine the least-cost means of cleaning up their own establishments.

Costs of Compliance: Coming into compliance with the Clean Air Act will be very expensive for Massachusetts. (For example, the Council of Economic Advisors estimated at the time the Act was passed that at least \$25 billion will be spent annually over the next decade for all states to come into compliance.) The challenge will be to keep the cost as low as possible. The multi-billion dollar cost will be borne principally by households (higher costs associated with driving and car repair costs; higher electricity bills) and businesses (higher pollution control equipment and fuel costs); the public sector costs will relate principally to public transportation measures. These costs must be weighed against the avoided health care costs and the economic stimulus/job creation benefits associated with expenditures in "green" equipment, alternative fuels, conservation measures and fewer dollars spent on out-of-state fossil fuels.

Additional Strategies:

- Participate in all areas of the Ozone Transport Commission and Northeast States for Coordinated Air Use Management (NESCAUM), to build larger markets for environmental technology, materials, services and offsets.
- Employ a public participation process for SIP development and a thorough advance regulatory review for all regulations, including a broad spectrum of interested parties (public agencies, industry officials, environmentalists, regional organizations) in our decision-making process and communicate at frequent intervals.

Public Participation

To insure that the right balance is chosen, the DEP and the Secretary's office are meeting with advisors from the industrial, academic, environmental and business communities on a regular basis. The Massachusetts Department of Environmental Protection has been making a point of going beyond the requirements for public hearings, consulting with industry groups and stakeholders regularly on each regulation being promulgated. An on-going SIP advisory group meets bimonthly.

Implementation of the Clean Air Act in Massachusetts: a Short-term Schedule

[illegible]

- ◆ On-going Activity or Technical Development
- ▼ Strategic Review: Agency and Public Participation

- *Development of Draft Report/Regulation & Public Hearing*
- *Due Date or Completion of Process or Reg. Complete*



Integrated Mobile Source Emissions Reduction Strategy

*Clean Cars...Clean Fuels...Good Maintenance...
Improve Transit Options and Reduce Total Miles Driven*

- Modeling shows that the state and the Eastern Seaboard, generally, need to reduce VOCs and NOx significantly. Both are precursors to ozone (smog).
- Motor vehicles are the largest single contributor to emissions of ozone precursors.

Massachusetts is proposing an integrated mobile source emissions strategy to affect all types auto use and resulting pollution. **Focusing on mobile sources takes pressure off the amount of reduction that needs to come from local job producing industries, large and small businesses and power plants.**

1) Clean Car Options

- ✱ Federal Motor Vehicle Current Standards
- ✱ Phase II (2005) Federal Motor Vehicle Standards
- ✱ California Low Emission Vehicles

Massachusetts Choice Strategy:

- ✓ **California Low Emission Vehicles (LEV)** (Massachusetts Legislature's LEV Commission is reviewing this option.)

2) Clean Fuel Options

- ✱ Conventional Gasoline
- ✱ Federal Reformulated Gasoline Phase I - 15% reduction in ozone
- ✱ Federal Reformulated Gasoline Phase II - 25% reduction in ozone
- ✱ California Severely reformulated Fuel

Massachusetts Choice Strategy:

- ✓ **Federal Reformulated Gasoline Phase I - 15% reduced ozone**
Massachusetts will look at phase II in the future.

3) Keeping Clean Cars Clean: Good Maintenance Options

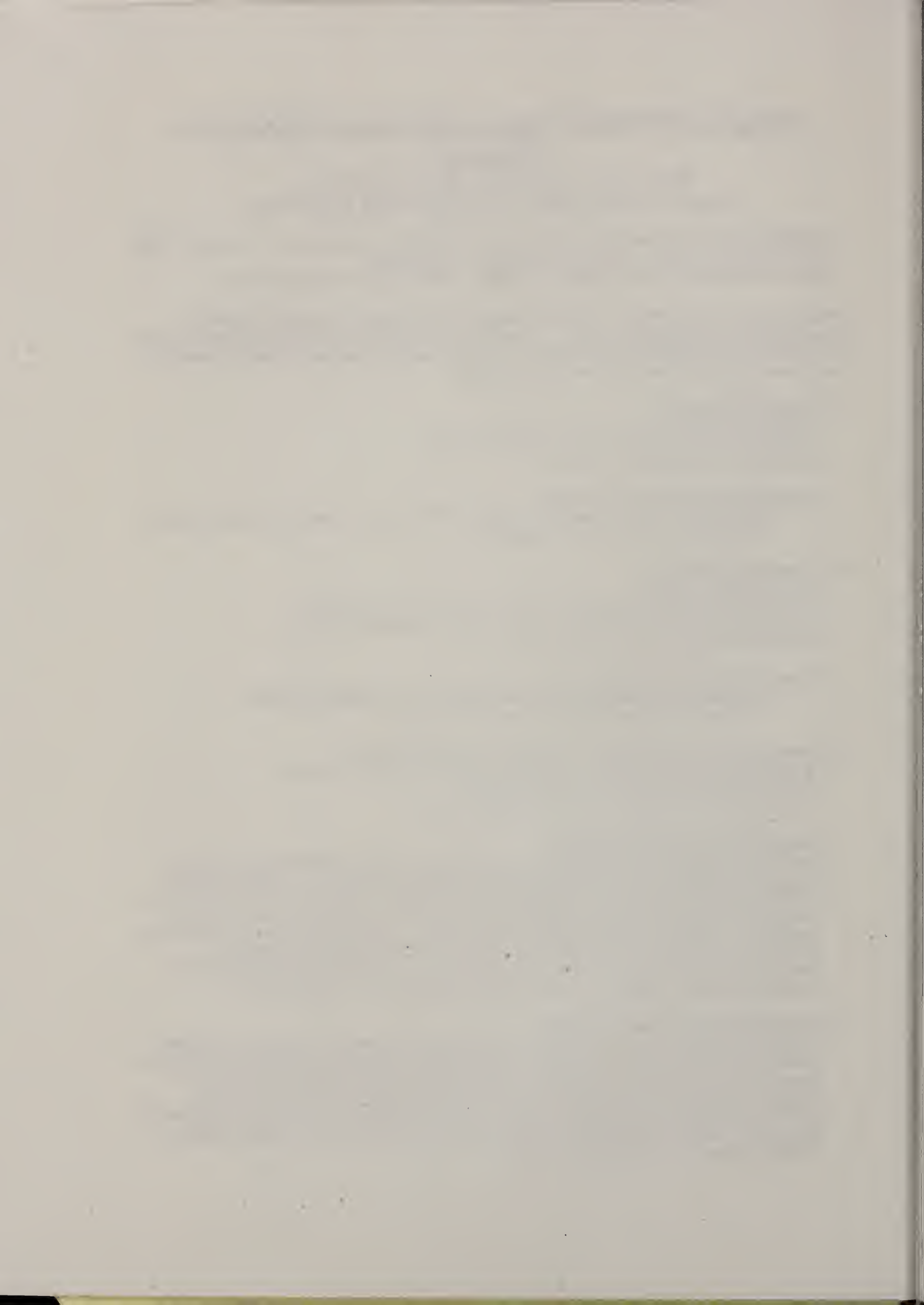
- ✱ Privately operated Decentralized System (Test and Repair System)
- ✱ Privately operated Decentralized (No repair)
- ✱ Privately operated Centralized Facilities (No repair)

Massachusetts Choice Strategy:

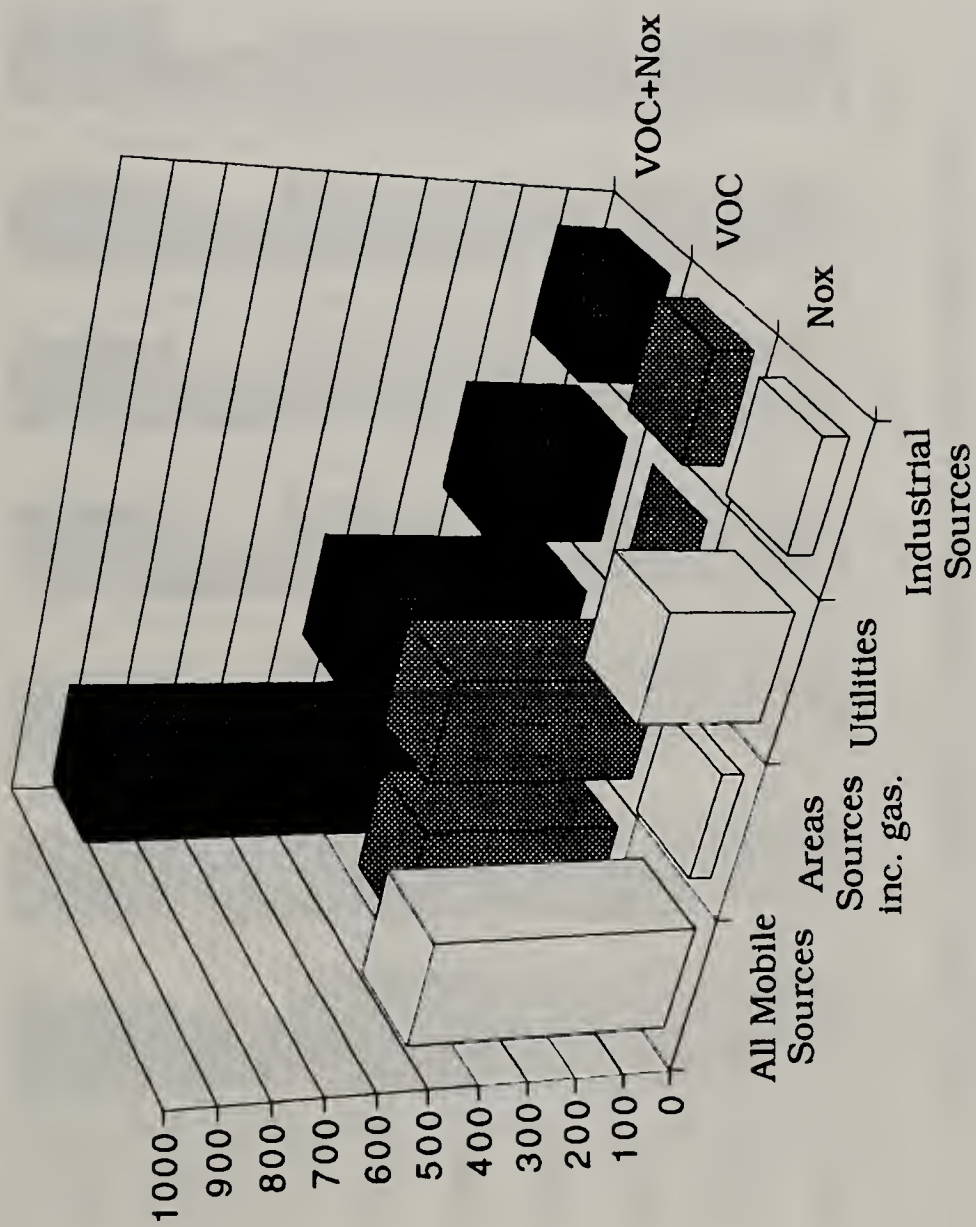
Enhanced Inspection and Maintenance Program is required for Massachusetts. The issue is under review by the Massachusetts' Legislative Inspection and Maintenance (I/M) Study Commission, co-chaired by Senator F. Berry and Representative P. Caron. A major revision to the existing Inspection and Maintenance system is expected to be required under new federal regulation; the amount of "credit" Massachusetts will receive for the new I/M program will depend upon how strict a program we implement. National studies have shown that new, much more expensive test equipment will be needed to test new "high-tech" engine and emissions systems in today's cars.

4) Transportation Control Measures

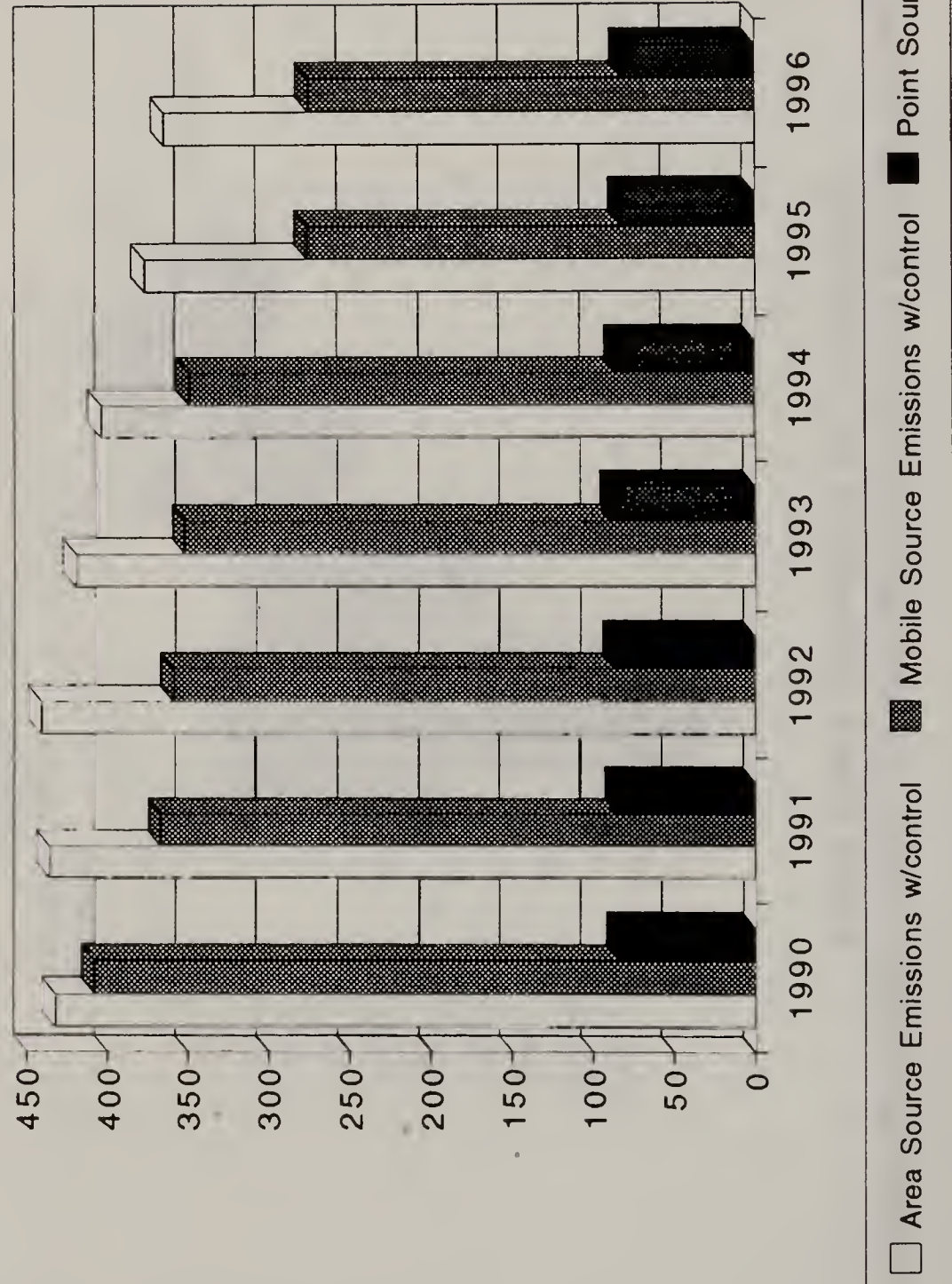
- ✱ Establish target reductions for the transportation systems and continue to upgrade transit, ridesharing and high occupancy vehicle lanes. Additional measures to be chosen by each region throughout the state to meet pollution reduction targets. Revise the Massachusetts Ridesharing Regulation to encourage reductions of trips statewide.
- ✱ VMT verification and growth controls: Every 3 years Massachusetts will have to verify that current VMT is consistent with VMT forecast in the SIP. If necessary, additional VMT reduction measures will be needed.



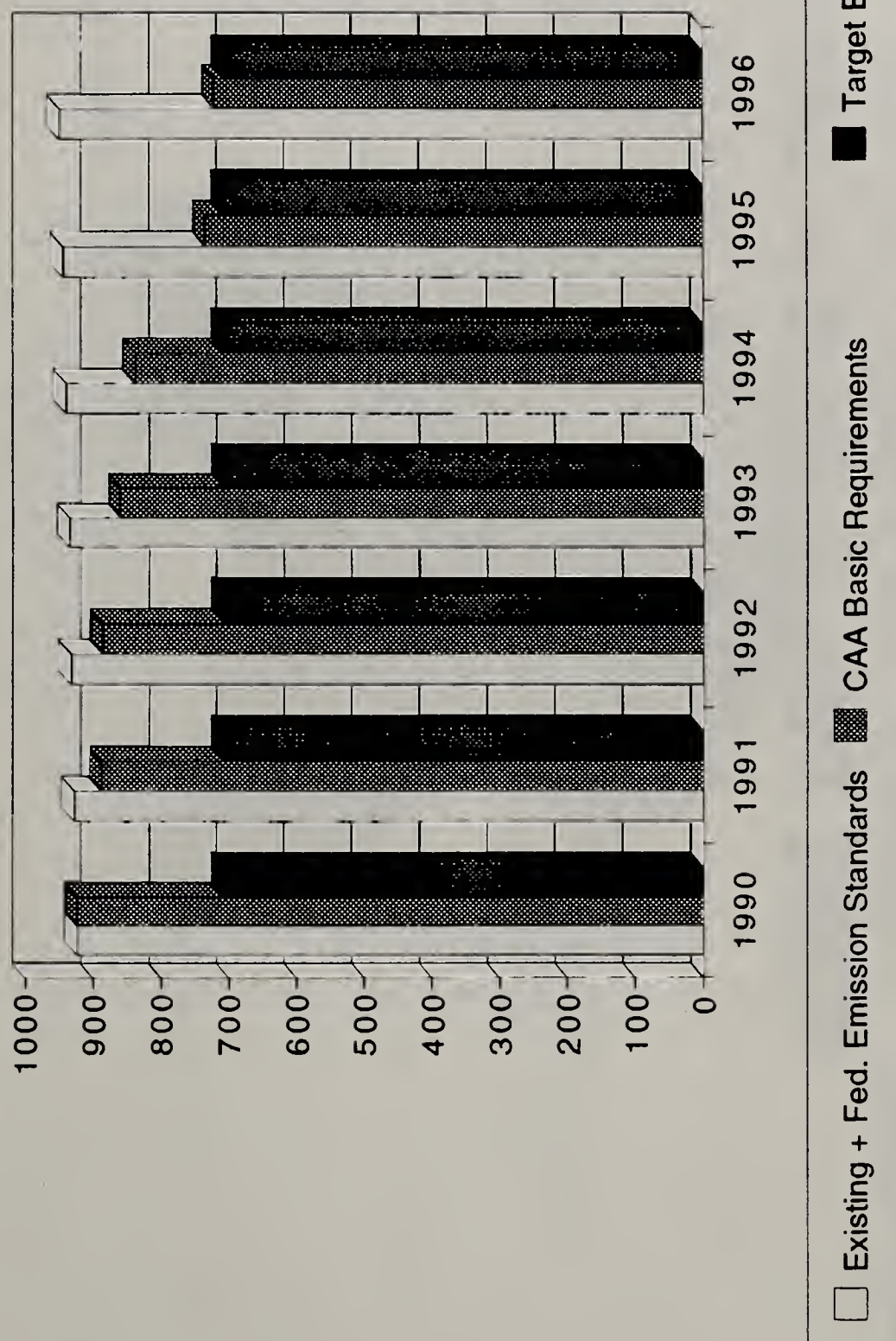
Amount of Smog-Causing Pollutants by Sector in the Massachusetts 1990 Draft Inventory (in tons/day)



Projected Massachusetts VOC Emissions: with existing and CLEAN AIR ACT REQUIREMENTS (in tons/day)

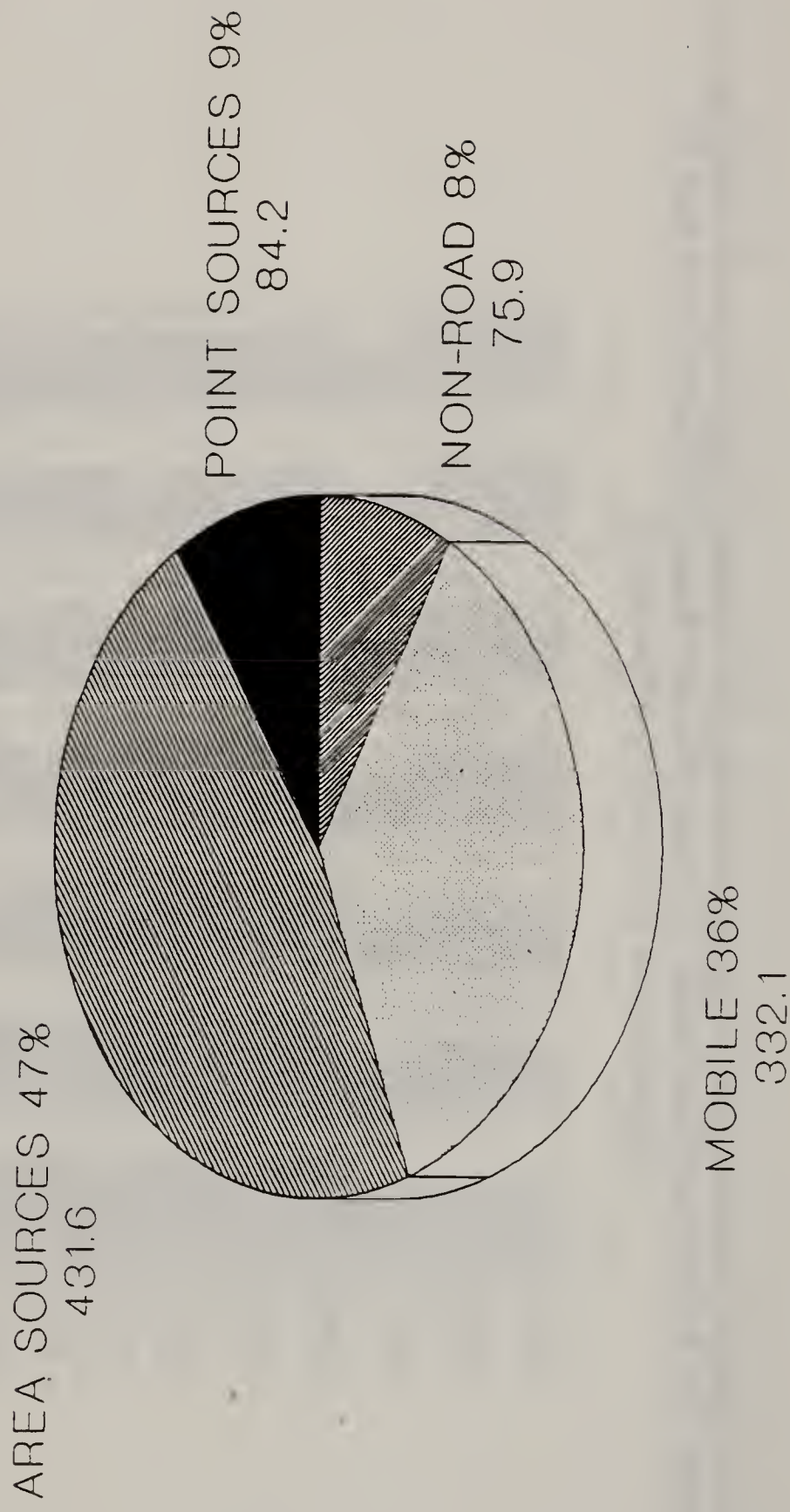


Projected Massachusetts VOC Emissions with: 1) Existing Regulations (including Federal Car Emission Standards), 2) Clean Air Act Basic Requirements and 3) Target Level (no growth allowance)



BASE YEAR INVENTORY 1990

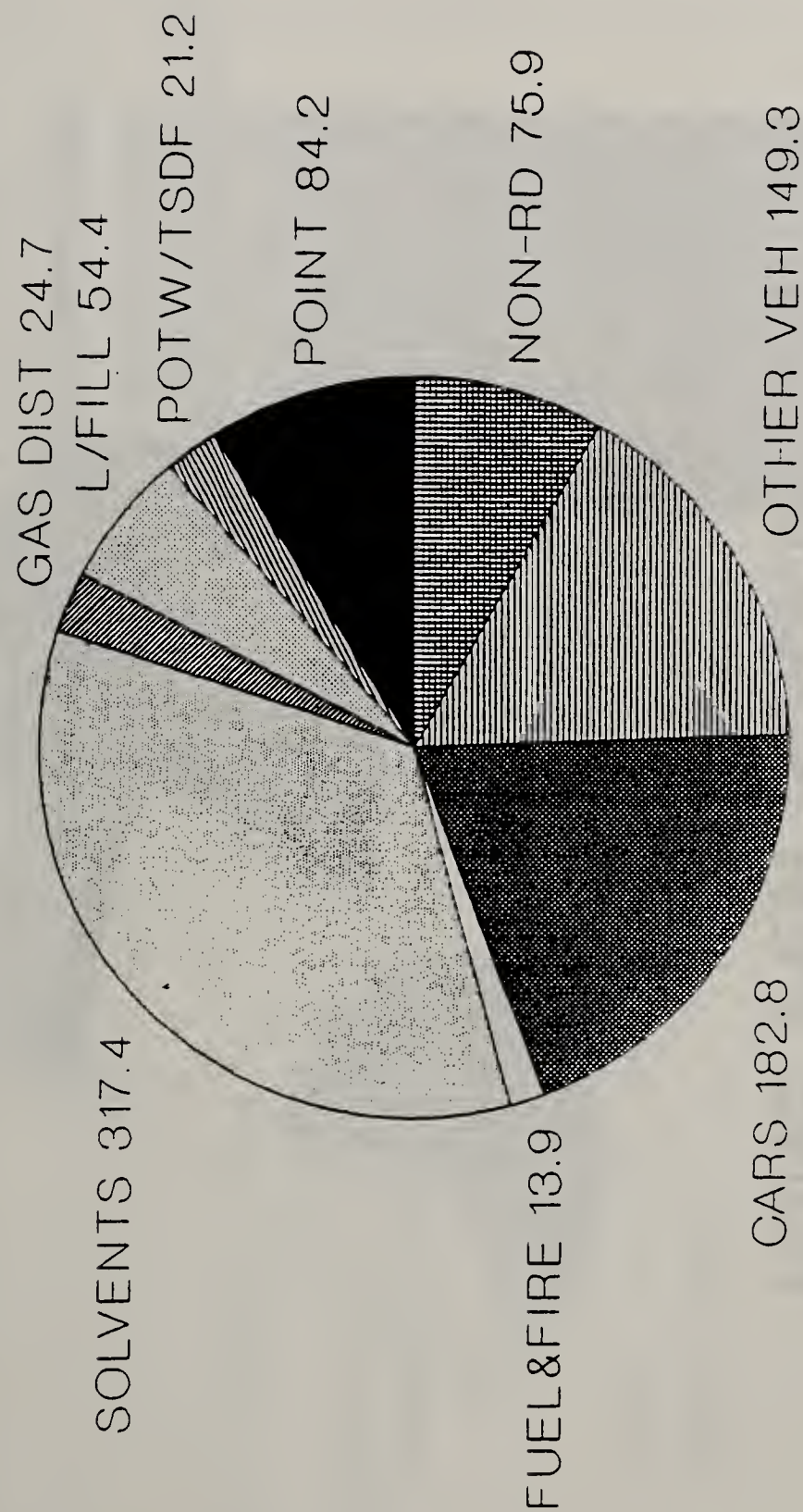
TONS PER SUMMER DAY



TOTAL VOC EMISSIONS (TSPD) = 923.7

EMISSION MAJOR CATEGORIES

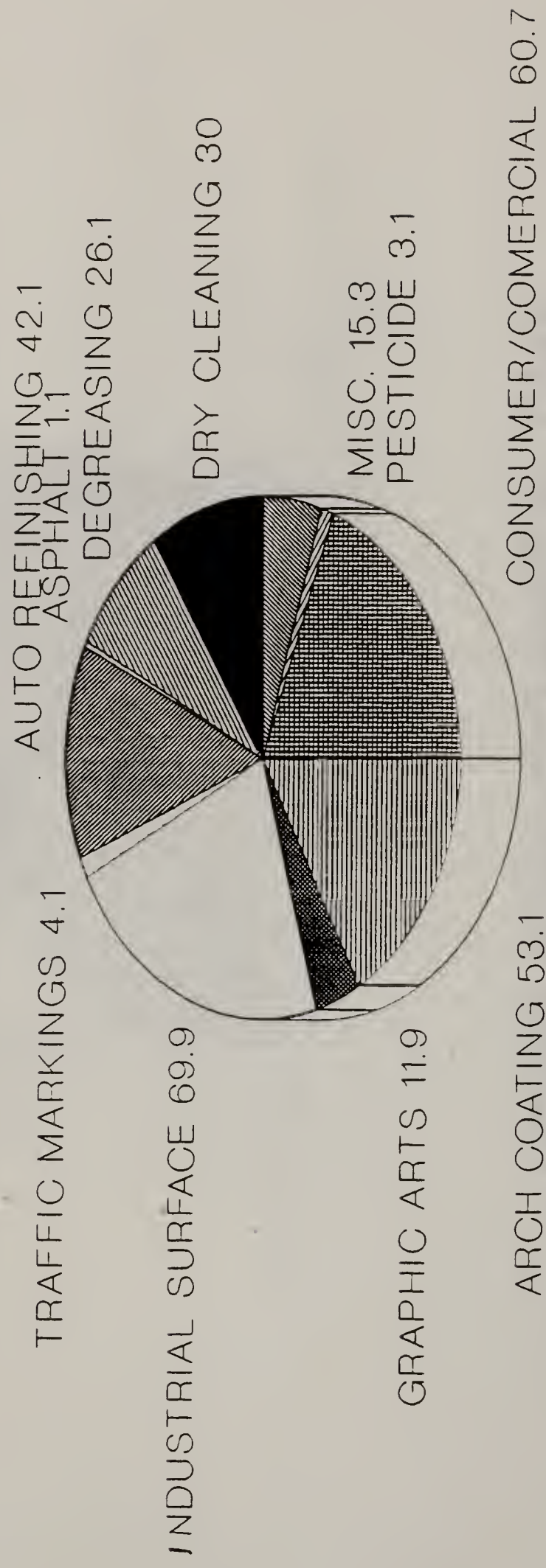
TONS PER SUMMER DAY



VOC

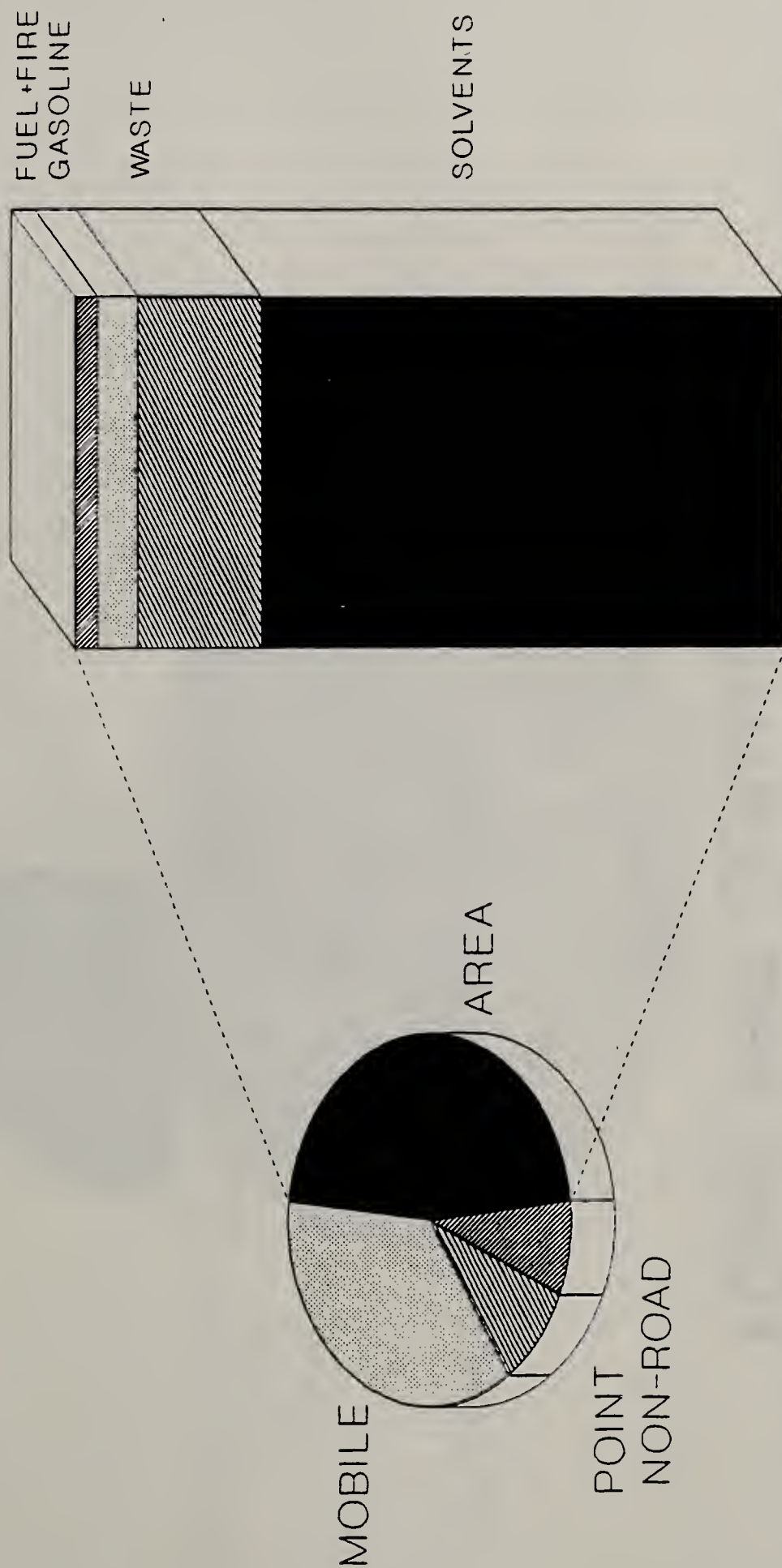
SOLVENTS

TONS PER SUMMER DAY



AREA EMISSIONS 1990

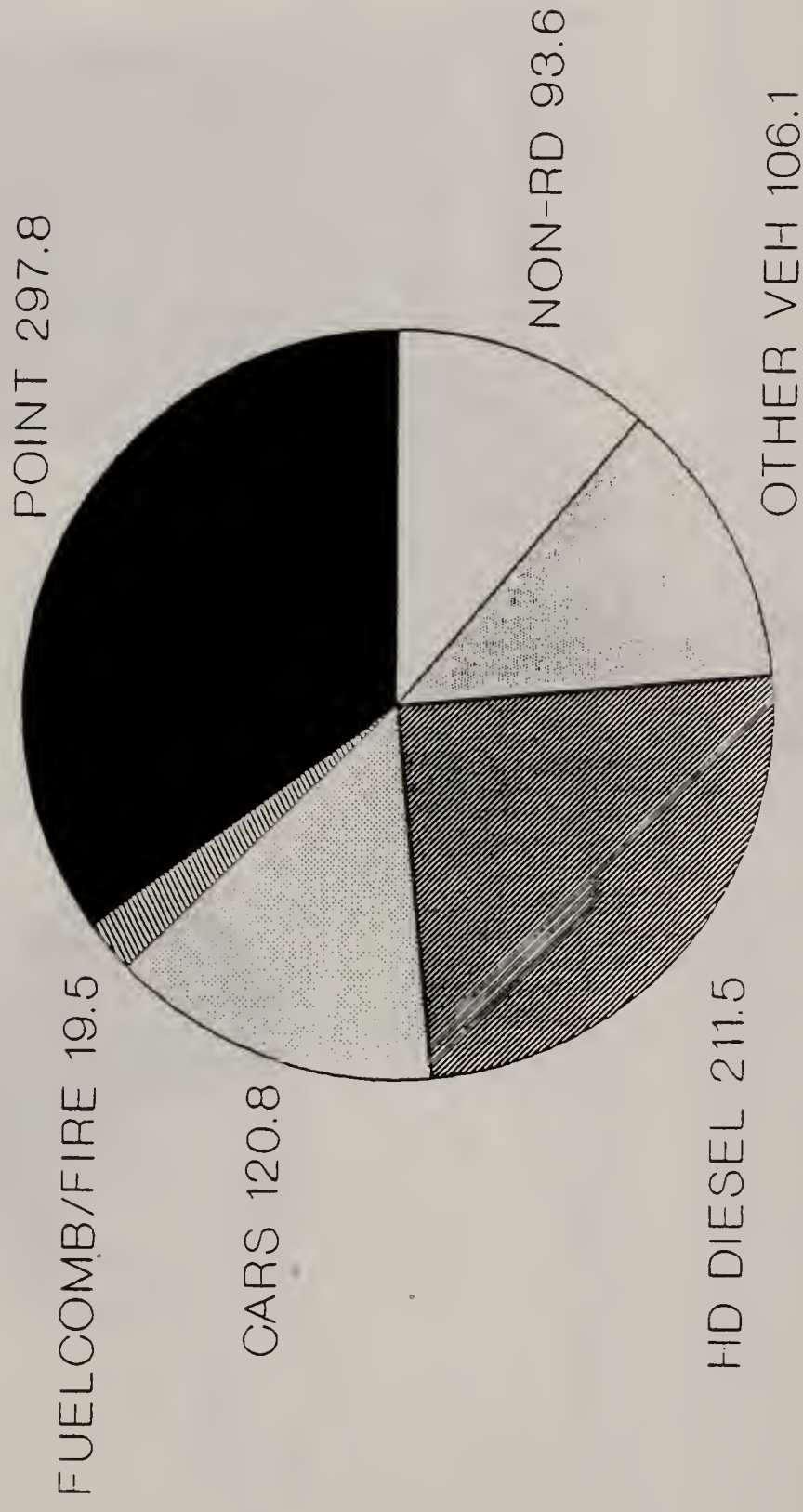
VOC



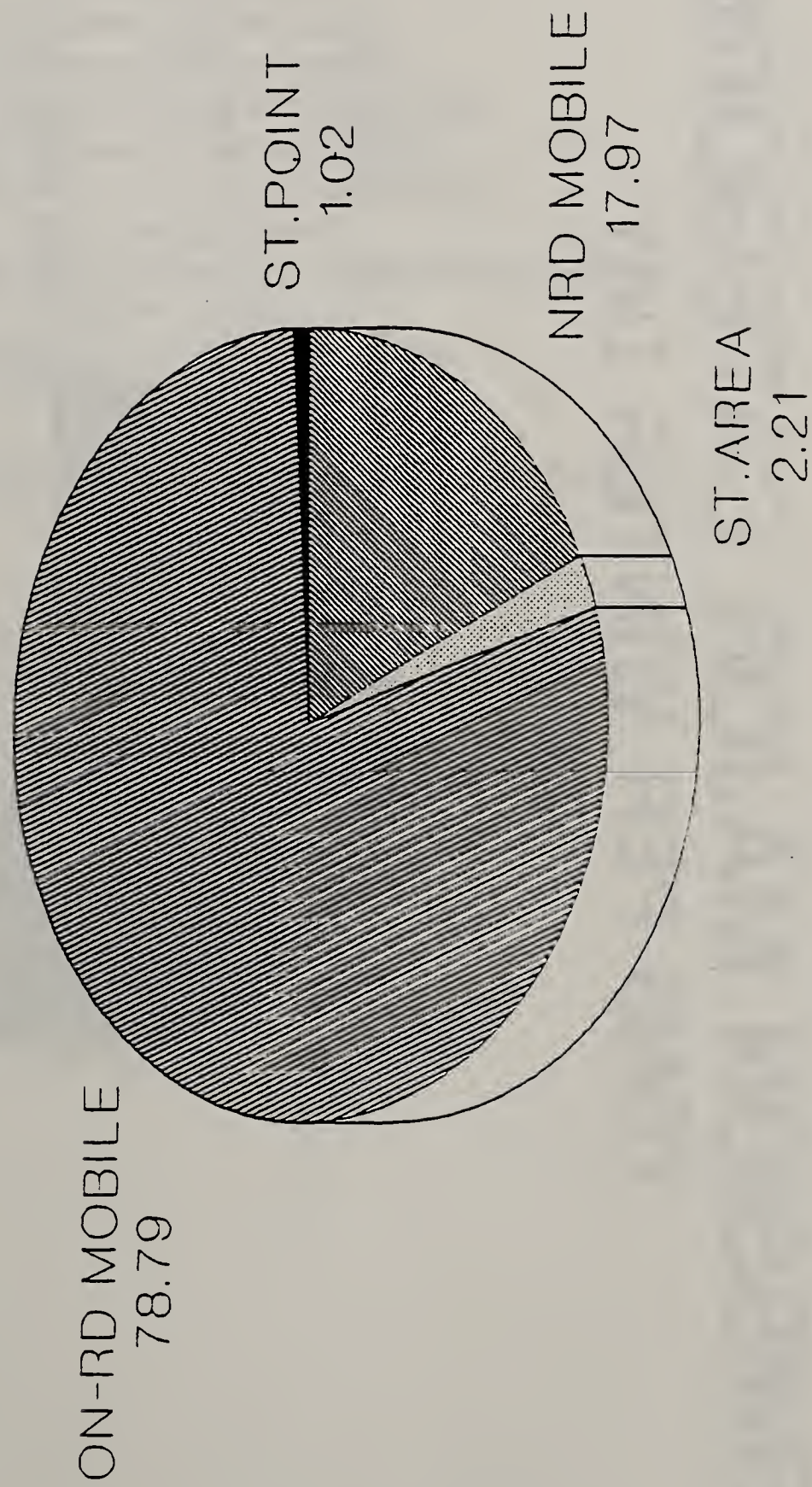
EMISSION MAJOR CATEGORIES

TONS PER SUMMER DAY

NOx

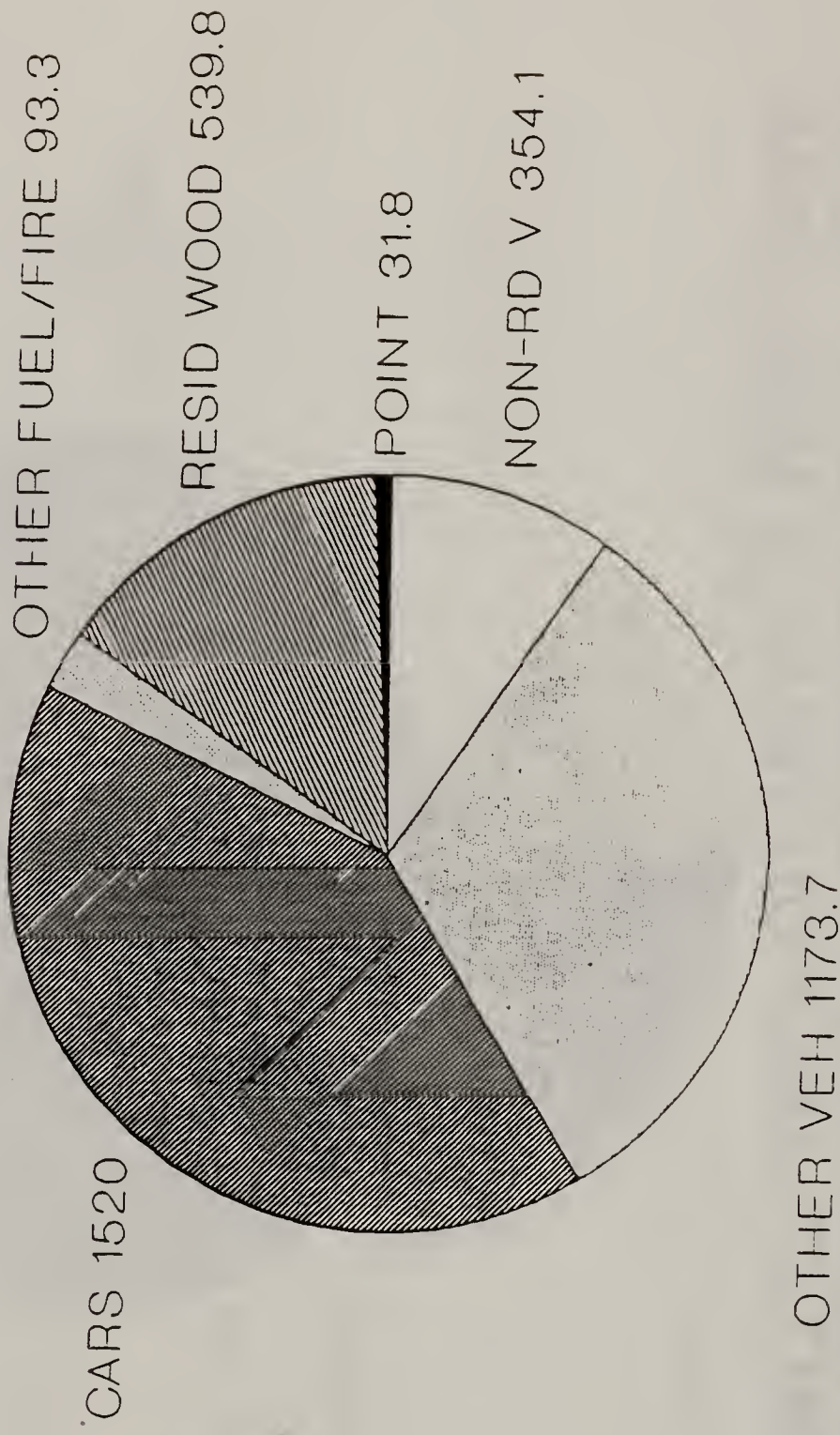


CO EMISSIONS SUMMER DAY 1990 ST.POINT, ST.AREA, ON-ROAD & NON-ROAD



EMISSION MAJOR CATEGORIES

TONS PER WINTER DAY



Small Businesses that will be Newly Regulated by the Clean Air Act Amendments

Gasoline Service Stations
Lawn and Garden services
Auto Repair Shops
Upholstery Repair shops
Painting and paper hanging
Paint Distributors and Manufacturing
Concrete work & asphalt paving
Commercial printing and lithography
Dry cleaning Plants
Large facilities including: Elementary and secondary schools
Fuel oil dealers
Wholesale chemical distributors
Tool and die plants
Medical labs
Water, sewer, pipeline and communications construction

How Emissions Trading Works

A Generic Model

Under the Clean Air Act Amendments of 1990, the Dibble Company must install RACT (Reasonably Available Control Technology). This technology will result in a reduction of the pollutant "dimethyl bad guy" of 25 pounds per day.

However, if the company installs BACT (the Best Available Control Technology) it will reduce its dimethyl bad guy emissions by 50 pounds per day, leaving virtually no emissions.

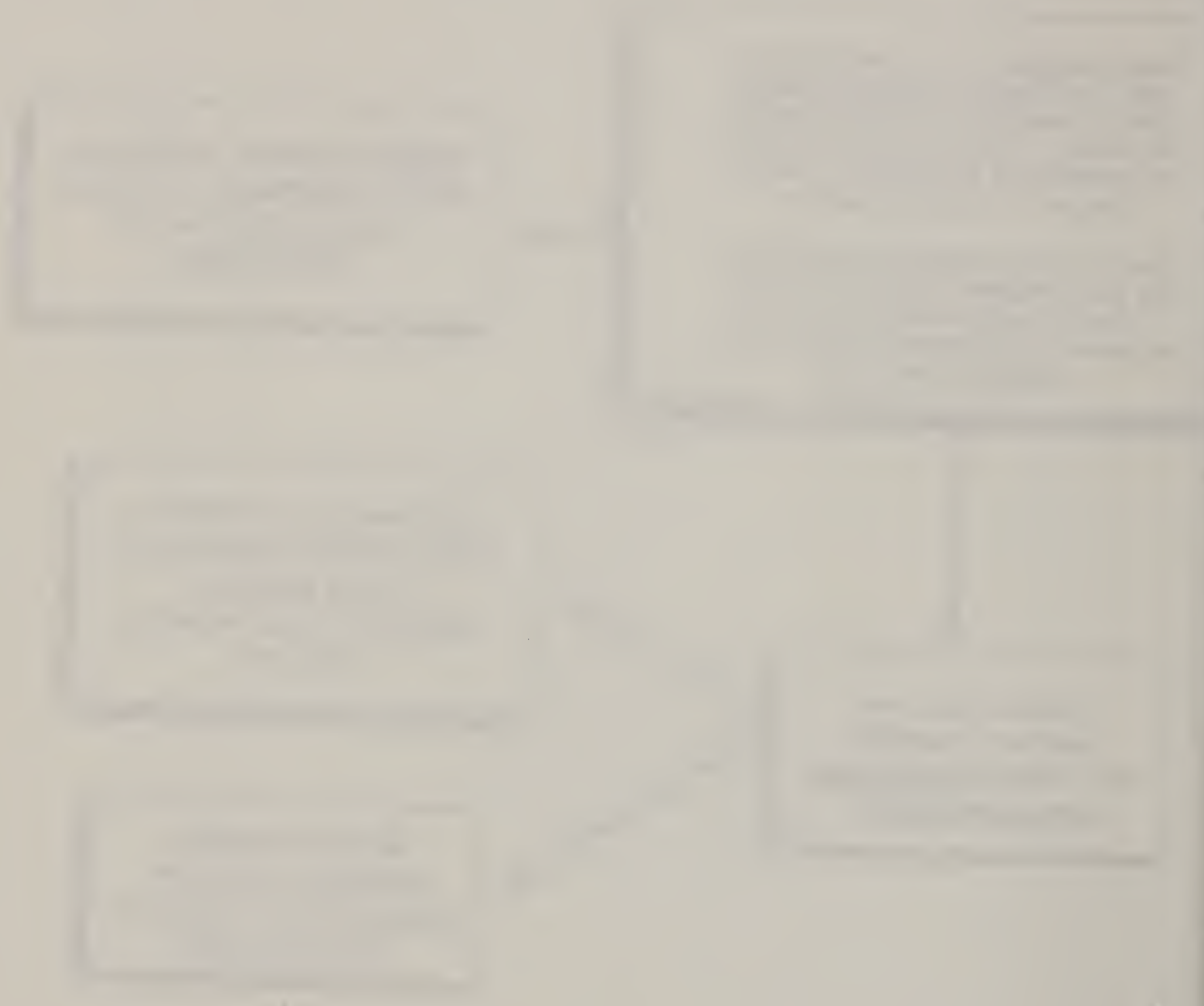
Install equipment which meets RACT requirements to comply with the Clean Air Act Requirements

Install BACT and produce emissions reductions beyond what is required by law.

Sell the emission reductions credits and keep the money or use the money to defray the cost of reducing emissions

Bank the emission reductions credits for company use for expansion in coming years

THEORY OF THE
EARTH'S CRUST
AND MANTLE



Existing and Proposed SIP Measures

Expected to be Filed in 1993 SIP

- Stage II Vapor Recovery (already state regulation)
- Electric Vehicle Demonstration Program
- Low Emissions Vehicle Program
- Clean Fuel Fleets
- Reformulated Gasoline
- Enhanced Inspection and Maintenance Program
- Alternative Fuels Pilot Program
- Transportation Control Measures (TCM): Fewer Total Miles of Travel
 - Revised Rideshare Regulation
 - Improved Parking Freezes
 - Transit and High Occupancy Vehicle Agreements from the Environmental Mitigation Agreements of the Central Artery and Third Harbor Tunnel
 - Other TCMs to be determined by each region state-wide
 - Congestion Pricing Mechanisms

Expected to be Filed in 1992 SIP

- Emissions Inventory
- VOC RACT
- NO_x RACT
- NSR/ Emissions Offsets

Implemented in 1982 SIP and Still in Effect

- Inspection and Maintenance Program
- Limit on Vehicle Idling
- Improved Public Transit Measures Package
- Area wide Carpooling
- Bicycle Lanes and Storage
- Park and Ride lots
- Variable Work hours
- Traffic Flow Improvements
- On-street Parking Controls
- Long-range Transit Improvements
- Exclusive Bus and Carpool Lanes
- Private Car Restrictions

Implemented in 1979 and Still in Effect

- Rideshare Regulation (310 CMR 7.16)

Implemented in 1975 and Still in Effect

- MBTA Commuter Pass Program
- Downtown Crossing Auto Restricted Zone
- I-93 High Occupancy Vehicle Lane
- Boston Parking Freeze
- Cambridge Parking Freeze
- Logan Parking Freeze (Since Revised)
- Fringe/Commuter Parking Program
- Limit On-street Parking (Boston and Cambridge)
- Computerized Carpool Matching (now called CARAVAN)
- Bicycle Use Promotion

THE HISTORY OF THE

REIGN OF
HENRY THE SEVENTH
OF ENGLAND
BY
JAMES HALLAM

VOL. I.
FROM THE DEATH OF
EDWARD THE FOURTH
TO THE DEATH OF
HENRY THE SEVENTH.

LONDON:
PRINTED BY
JOHN WATTS,
STATIONER, &c.

IN THE STRAND,
NEAR CHURCH LANE.

1839.

THE HISTORY OF THE

REIGN OF
HENRY THE SEVENTH

OF ENGLAND
BY
JAMES HALLAM

TARGET LEVEL EMISSIONS CALCULATION

The minimum emission reduction required by the CAA is the target level emission level. Massachusetts is required to institute a 15% reduction in Volatile Organic Compounds (VOC) emissions between 1990 and 1996, net of growth. Between 1996 and 1999, Massachusetts must reduce our VOCs and/or NOx emissions by 3% per year, net of growth. Estimates are based on the 1990 emission inventory.

1990 Base Year VOC Inventory

	<i>in tons/day</i>
Point Sources	84
Area Sources	432
Mobile Sources	408
<i>Biogenic Sources</i>	<u>655</u>
1990 BASE YR TOTAL	1,579

1990 Man-made Inventory 924 tons/day

1990 Adjusted VOC Inventory

(Recalculated to exclude the federal motor vehicle emissions control program as required by EPA Inventory Procedures)

	<i>in tons/day</i>
Point Sources	84
Area Sources	432
Mobile Sources	<u>306</u>
1990 ADJUSTED BASE YR TOTAL	822 tons/ day

1990-1996 GROWTH ADJUSTMENT

			Annual% growth 90-96	(data source)
Point	84 tons/day	multiplied by	1.5 %	(BEA)
Area	432	multiplied by	1.0 %	(BEA)
Mobile	<u>306</u>	multiplied by	4.1 %	(MHD)
Total	822 tons per day			

1990 Emissions Forecast to 1996 (accounting for growth)

	<u>Forecast 1996 emissions</u>
Point	92 tons/day
Area	459
Mobile	<u>373</u>
Total	924 tons per day

MINIMUM REDUCTION NEEDED BY 1996

(15% reduction plus net of growth)

1996 Growth emissions (924 tons/day)

- 1996 Target Level Emissions (701 tons/day)

Minimum % Reduction from Adjusted Inventory (223 tons/day)

NEEDED TO MEET 1996 CAA REQUIREMENTS: 25%

ADDITIONAL REDUCTION NEEDED 1996-1999

= 3% per year net of growth of VOC and/or NO_x Emissions

An additional 3% per year is calculated based on the 1996 Target Level Emissions being reached. Again, the Mobile source emissions are adjusted to discount for the FMVECP and the Motor vehicle Tier I standards which are due to begin in 1995. This creates a 1996 base which is used to calculate the 3% increment. The growth increment is then calculated for each year 1997 to 1999.

Estimated Base Year 1996 Emissions

Point	89 tons per day
Area	373 tons per day
Mobile	<u>228</u> tons per day
	690 tons per day

Adjusted Base Year 1996 Emissions

Point	89 tons per day
Area	373 tons per day
Mobile	<u>205</u> tons per day
	667 tons per day

1999 Target Level Emissions

91% of Adjusted Base Year or 610 tons per day

1996-1999 GROWTH ADJUSTMENT

			Annual% growth 90-96	(data source)
Point	89 tons/day	multiplied by	1.5 %	(BEA)
Area	373	multiplied by	1.0 %	(BEA)
Mobile	<u>205</u>	multiplied by	4.1 %	(MHD)

1996 Emissions Forecast to 1999 Accounting for Growth

Point	93 tons per day
Area	384 tons per day
Mobile	<u>231</u> tons per day
	708 tons per day

MINIMUM REDUCTION NEEDED (1996 - 1999)

(3% per year reduction plus net of Growth)

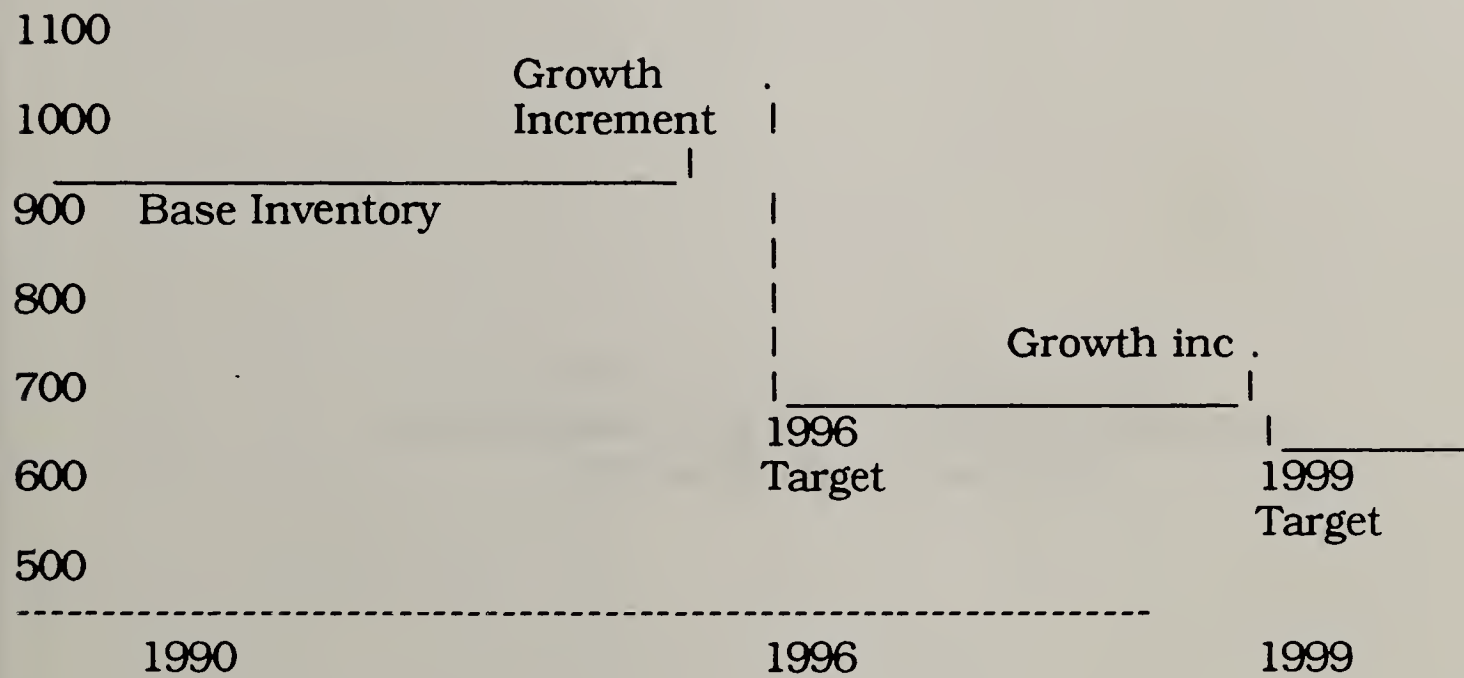
1999 Growth emissions minus 1999 Target Level Emissions =
708 tons per day minus 610 tons per day = 98 tons per day

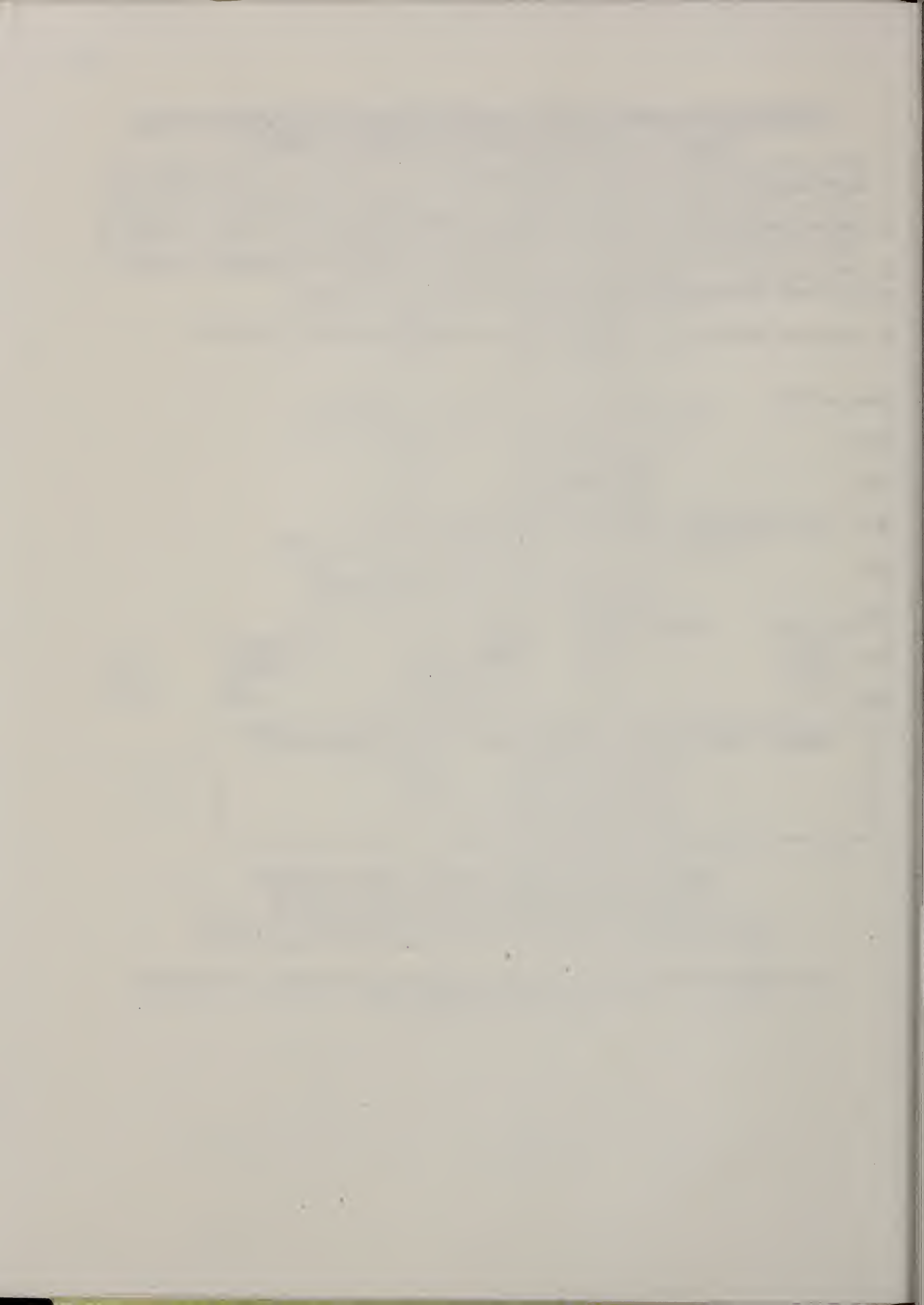
**MINIMUM % REDUCTION FROM 1990 BASE NEEDED TO MEET CAA
REQUIREMENTS: 36%**

**MASSACHUSETTS TARGET REDUCTION REQUIREMENTS:
To Meet the Requirements of the CAA of 1990**

1. Base Year 1990 Anthropogenic Emissions
2. 15% reduction in VOC emissions plus net growth by 1996
3. 9% reduction in VOC emissions from base 1996 (NOx emissions can be substituted) plus net growth by 1999
4. Maintain 1999 Target level into future (continuous netting of growth)

tons per day





What's In Store for the Next Year
EPA Schedule for Clean Air Act Implementation
September 92 - December 93



EPA Schedule Clean Air Act Implementation Plan

Strategy Target Date	Title	Activity	Completed	Statutory Deadline
Sept-92	Title I - Nonattainment	Issue transportation planning guidance (EPA/DOT)		
		Finalize guidance on transportation air quality planning		Aug-91
		Finalize PM-10 area reclassifications		Dec-91
		Propose economic incentive rules		
		Finalize PM-10 BACM technical guidance		May-92
	Title II - Mobile Sources	Finalize clean fuels fleet (TCM's)		Nov-91
		Propose revisions to motor vehicle certification procedures (I/M short test)		
	Title III - Air Toxics	Propose regulatory schedule for all source categories		
		Finalize early reductions rulemaking		
		Propose standards for large MWC's		
		Propose standards for small MWC's		
		Propose general provisions for MACT standards (40 CFR Part 63)		
		Propose MACT for hazardous organic chemical manufacturing		
	Title VI - CFC's	Propose accelerated CFC phaseout		
	Title VIII - Miscellaneous	Publish section 811 report (International Competitiveness)		May-92
Oct-92	Title I - Nonattainment	Publish 1991 air quality data and emission trends report		
		Propose transportation conformity criteria		
	Title II - Mobile Sources	Propose clean fuel fleet vehicle standards, conversions, and general provisions		Nov-92
	Title IV - Acid Rain	Finalize excess emission requirements		May-92
		Finalize allowance trading system		May-92
		Finalize continuous emission monitoring requirements		May-92
		Finalize conservation and renewable resource incentives		May-92
		Finalize acid rain permit program		May-92

EPA Schedule Clean Air Act Implementation Plan

Strategy Target Date	Title	Activity	Completed	Statutory Deadline
Nov-92	Title I - Nonattainment	States submit RACT catch-up rules, NSR rules, CO attainment demonstration and contingency measures		Nov-92
		States submit small business assistance programs		Nov-92
		States submit base ozone, CO emission inventories		Nov-92
		States receive emission source statements		Nov-92
		PM-10 PSD increments (11/92 court agreement)		
	Title II - Mobile Sources	Propose reformulated gasoline complex model		
		Publish draft mobile source air toxics study		
		Finalize urban bus 94+ (PM standard)		Jan-92
		Finalize rules for lead substitution of gasoline additives		Nov-91
		Finalize enhanced I/M regulation		Nov-91
	Title III - Air Toxics	Complete study of hydrogen sulfide emissions from extracting natural gas and oil		Nov-92
		Complete study of the hazards of hydrofluoric acid		Nov-92
		Finalize MACT for dry cleaners (per court order)		Nov-92
		Propose MACT for coke ovens		
	Title VI - CFC's	Propose safe alternatives		
	Title VIII - Miscellaneous	Issue report on the impact of the 1990 CAA Amendments on visibility in Class I areas		Nov-92
Dec-92	Title I - Nonattainment	Finalize additional PM-10 nonattainment areas		
		Publish alternative control technology documents for VOC's		Nov-93
	Title II - Mobile Sources	Finalize emission control diagnostic rule		May-92
		Publish procedures of enforcement for urban bus standards		
	Title VI - CFC's	Finalize ban on nonessential products		Nov-91
Jan-93	Title I - Nonattainment	Approve/disapprove first PM-10 SIPs		Jan-93
		Propose tank vessel rule		
	Title II - Mobile Sources	Submit transportation systems report to Congress		Jan-93
		Finalize urban bus retrofit		Nov-91
	Title III - Air Toxics	Propose MACT for chromium electroplating		
	Title VI - CFC's	Propose procurement regulations		
	Title VII - Enforcement	Propose rules for contractor listing		
		Propose rules for field citation program		

EPA Schedule Clean Air Act Implementation Plan

Strategy Target Date	Title	Activity	Completed	Statutory Deadline
Feb-93	Title II - Mobile Sources	Finalize reformulated gasoline regulations		Nov-91
	Title III - Air Toxics	Propose MACT for commercial sterilizers		
		Finalize list of substances for accidental releases prevention program		Nov-92
	Title IV - Acid Rain	Sources submit Phase I permit applications and proposed compliance plans		Feb-93
		Propose OPT-IN regulations-combustion sources		
		Finalize list of Phase II utility allowances		Dec-92
	Title VI - CFC's	Finalize CFC labeling regulations		May-92
	Title VII - Enforcement	Propose rules for enhanced monitoring and compliance certification		
Mar-93	Title I - Nonattainment	Finalize economic incentives rules		Nov-92
		Publish SOCOMI distillation processes CTG		Nov-93
		Propose general conformity criteria		
		Publish SOCOMI reactor processes CTG		Nov-93
	Title II - Mobile Sources	Finalize reformulated gasoline complex model		
		Publish mobile-source related air toxics study		May-92
		Determine significance of non-road engine emissions and conduct rulemaking		Nov-92
		Finalize revisions to motor vehicle certification procedures (I/M short test)		Nov-91
	Title III - Air Toxics	Propose guidance for modification provisions		
		Propose guidance for State air toxics program		
	Title IV - Acid Rain	Initiate auctions and sales of allowances		Mar-93
Apr-93	Title I - Nonattainment	States submit lead SIPs (18 months from designation)		Jul-93
		Promulgate sanctions for States failing to submit RACT fix-up rules (18 months from findings)		Apr-93
		Finalize rules for enhanced monitoring of ozone, NOx, VOC's		May-92
	Title II - Mobile Sources	Finalize procedures of enforcement for urban bus standards		May-92
	Title III - Air Toxics	Propose State I gasoline marketing MACT		
May-93	Title I - Nonattainment	Finalize discretionary sanctions rules		
		Propose revisions to NSR program		
	Title II - Mobile Sources	Complete testing protocols for fuels and additives		
	Title VI - CFC's	Finalize emission reduction program		Jan-92

EPA Schedule Clean Air Act Implementation Plan

Strategy Target Date	Title	Activity	Completed	Statutory Deadline
Jun-93	Title VII - Enforcement	Finalize rules for citizen suits		
		Finalize rules for monetary awards		
Jul-93	Title I - Nonattainment	Publish 185B NOx/VOC study		Feb-92
	Title II - Mobile Sources	Finalize clean fuel vehicle standards, conversions, and general provisions		Nov-92
	Title III - Air Toxics	Finalize HAP list petition procedures		
		Finalize general provisions for MACT standards		
Aug-93	Title I - Nonattainment	Finalize transportation conformity criteria		Nov-91
	Title II - Mobile Sources	Finalize vehicle evaporative emissions regulations		Aug-93
	Title III - Air Toxics	Finalize MACT for coke ovens		Dec-92
	Title IV - Acid Rain	EPA action on Phase I permits		Aug-93
		Finalize NOx requirements for utility boilers		May-92
Sept-93	Title III - Air Toxics	Finalize regulatory schedule for all source categories		Nov-92
		Propose medical waste incinerator rule		
	Title VI - CFC's	Finalize safe alternatives program		Nov-92
Oct-93	Title I - Nonattainment	Promulgate FIP's for States failing to submit RACT fix-up rules (2 years from findings)		
		Publish air quality and emission trends report		
	Title III - Air Toxics	Finalize MACT for hazardous organic chemical manufacturing		Nov-92
		Propose MACT for pulp and paper		
		Finalize standards for large MWC's		Nov-91
		Finalize standards for small MWC's		Nov-92
		Propose MACT for polymers and resins II		
	Title IV - Acid Rain	Begin issuing allowances to small diesel refineries		Oct-93
		Propose OPT-IN regulations, process sources		
	Title VI - CFC's	Finalize procurement regulation		May-92

EPA Schedule Clean Air Act Implementation Plan

Strategy Target Date	Title	Activity	Completed	Statutory Deadline
Nov-93	Title I - Nonattainment	Submit consumer/commercial products study report to Congress		Nov-93
		Publish alternative control technology documents for NOx sources		Nov-93
		Publish results of ozone design value study		Nov-93
		States submit selected SIP provisions for moderate and above ozone areas		Nov-93
		Publish auto body refinishing CTG		Nov-93
		Publish batch processes CTG		Nov-93
		Publish petroleum/industrial wastewater CTG		Nov-93
		Publish plastic parts coating CTG		Nov-93
		Publish storage tanks CTG		Nov-93
		Publish web offset lithography CTG		Nov-93
		Publish SOCM batch processes CTG		Nov-93
		Publish surface coal mining study		Nov-93
		Finalize general conformity criteria		Nov-91
	Title III - Air Toxics	Submit Great Lakes study report to Congress		Nov-93
		Publish urban area strategy - research report		Nov-93
		Submit NAS study to Congress		May-93
		Finalize rules for risk management plans and prevention programs		Nov-93
		Publish guidance for State air toxics programs		Nov-91
	Title IV - Acid Rain	States submit acid rain permit program proposals		Nov-93
		Promulgate SO ₂ new source performance standards (NSPS) for new fossil fuel utility units		Nov-93
	Title V - Permits	States submit operating permit programs		Nov-93
	Title VIII - Miscellaneous	Publish interim source/receptor report on visibility		
Dec-93	Title VII - Enforcement	Finalize rules for contractor listing		
		Finalize guidance/rules for field citation program		



The Clean Air Act Amendments of 1990

Background on the Act &
its Implementation
in the
Commonwealth of Massachusetts

THE CHURCH OF THE
ANGELUS

THE CHURCH OF THE
ANGELUS
OF THE
ANGELUS

Clean Air Act: 1990 Amendments

What's in the New Law

Nonattainment: Title I

Mobile Sources: Title II

Hazardous Air Pollutants: Title III

Acid Rain: Title IV

Permits: Title V

Stratospheric Ozone: Title VI

Enforcement: Title VII

Miscellaneous Provisions: Title VIII

Research: Title IX

Disadvantaged Business: Title X

Employment Transition: Title XI

General Provisions of the Amendments

- New Timetable: A tight but achievable timetable is established to reach clean air standards
 - Revisions required to State Implementation Plans (SIPs)
 - Control more, smaller sources
 - Re-examine and tighten control levels including on existing sources of pollution, not just new ones.
 - Expand Accounting Requirements
 - Direct all federally-funded programs to work towards the Act's goals.
-

Other Provisions

- Creation of the Ozone Transport Region to study and organize regional solutions
 - Controls on Stationary Sources Enhanced
 - Increased focus on mobile and off-road pollution sources
 - Stratospheric Ozone Protection
 - New Operating Permits Program
 - Air Toxics
-

Basic Goals of the Clean Air Act

- Protection of Human Health
 - Eliminate Smog
 - Reduce Toxic Chemicals in the Air by 95%
 - Protection of the Environment
 - Reduce Acid Rain
 - Improve Urban Visibility
 - Protect against further stratospheric ozone depletion
 - Balance Environmental, Energy & Economic Issues
 - Use market-based approaches to accomplish environmental benefits
-

Health and Materials Impacts of Ozone

Health Impacts

Irritates Membranes of respiratory system
Causes impaired lung function, reduces resistance
to colds and serious lung diseases such as pneumonia

Can aggravate chronic heart diseases, asthma,
brochitis and emphysema

Decreases lung capacity for several hours
after exposure

Material Impacts

Corrodes materials such as rubber, paint and vinyl
(Cars deteriorate faster!)

Injures crops and reduces output
by as much as 20%

Injures and kills trees and shrubs

Health Impact of Carbon Monoxide

Interferes with the body's ability
to absorb oxygen

Impairs thinking and perception,

Causes drowsiness and in large
doses causes death

Delays fetal development

Long-term exposure aggravates
arteriosclerosis and
vascular and heart diseases.

Title I

Ozone Non-attainment

Requires states to revise State Implementation Plans for ozone to achieve the standard (by a specific date based on the severity of the pollution). To accomplish this states must:

- Demonstrate new levels of coordination between Federal, State and Local Agencies
 - Develop Comprehensive Transportation Plans
 - Evaluate whether transportation projects conform to the SIP
 - Adopt transportation control measures
 - Have constant % reductions
 - Prepare new SIPs
-

Massachusetts Area Designation by Criteria Pollutant

**Ozone: "Serious" Non-attainment
Statewide**

CO: Moderate Nonattainment

Boston	Cambridge
Chelsea	Everett
Malden	Medford
Quincy	Revere
Somerville	

CO: "Unclassified" Nonattainment

Lowell	Springfield
Waltham	Worcester

Nitrogen Dioxide: Attainment State-wide

Inhalable Particulates: Unclassified

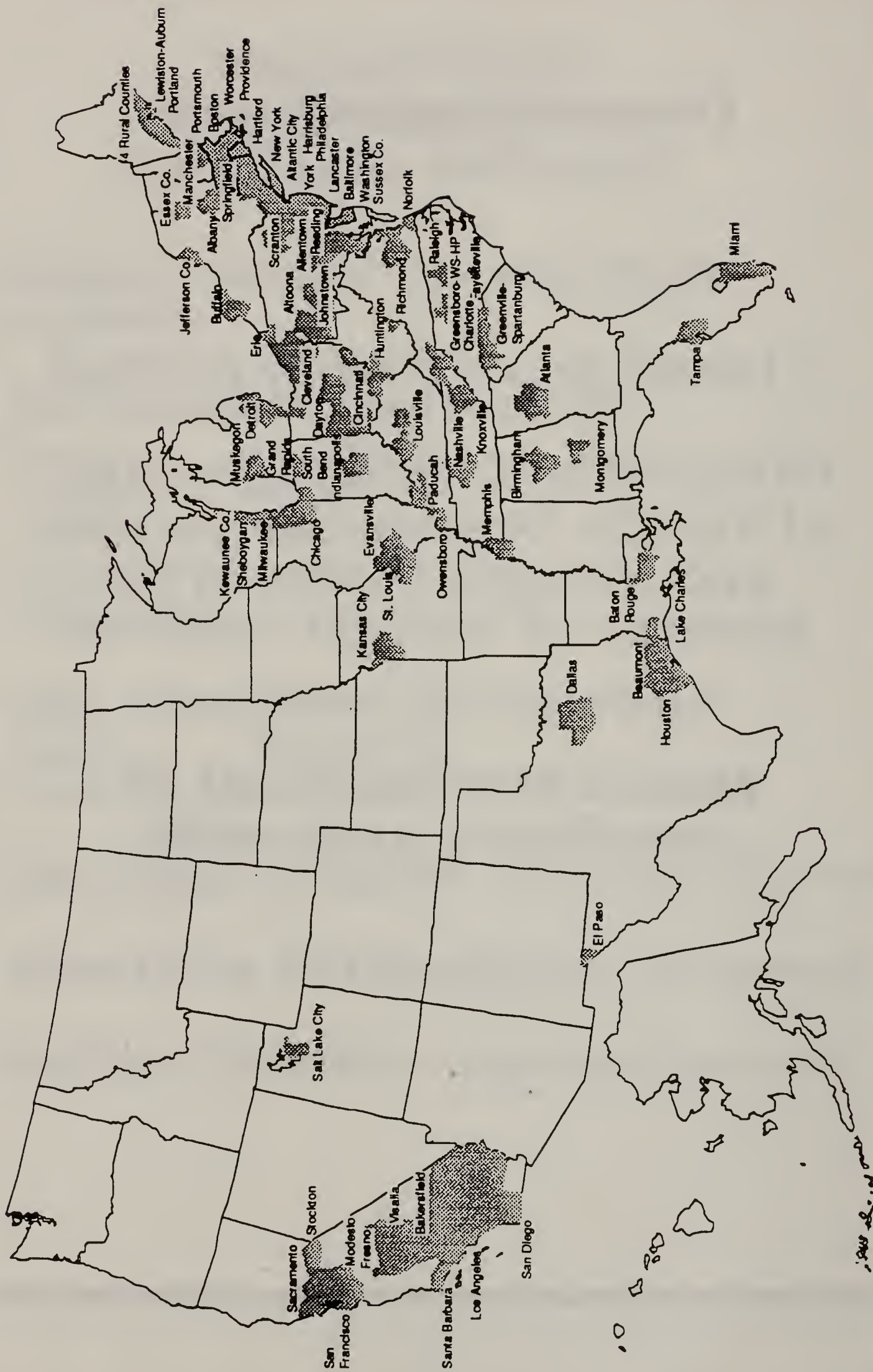
Sulfur Dioxide: Attainment State-wide

Ozone Non-attainment

- Ozone is not directly emitted
- Formed by Chemical Reaction of Volatile Organic Compounds and Nitrogen Oxides in the presence of sunlight and heat

Massachusetts is out of compliance state-wide.

Ozone Areas Violating Standards During 1987-1989



Selected
Ozone Nonattainment Areas
Outside of Massachusetts*
(by category of severity)

Extreme

Los Angeles

Severe

Baltimore
Houston
New York
San Diego

Chicago
Milwaukee
Philadelphia

Serious

Atlanta
Baton Rouge
El Paso, TX
Hartford, CT
Providence, RI
Washington, D.C.

Bakersfield, CA
Beaumont, TX
Fresno, CA
Huntington, WV
Sacramento, CA

** Massachusetts is in the Serious category*

Ozone Emission Reduction Requirements

Must achieve the following targets:

Short-term:

15% Reduction in VOC Emissions in 1996
(Net of Growth from 1990 base year)

Long-term:

Whatever additional reductions
are necessary in order to attain air
quality standards, which must be
at least an additional 9% reduction in
VOC and/or NO_x by 1999

SIP DEVELOPMENT PROCESS

- ☐ Prepare an Inventory of Pollution in Base Year (1990): *Due in 1992*
 - ☐ Target how much reduction is needed to reach Clean Air Standards
 - ☐ Project what the future inventory will be (1996, 1999)
 - ☐ Develop a Strategy Plan: *Due in 1993*
 - ☐ Test the Strategy Plan: *Due in 1994* (Attainment Demonstration)
 - ☐ Use Additional Strategies if Necessary
 - ☐ Track the Rate of Progress: *Due in 1997, 2000, etc.*
 - ☐ **By November 15, 1992:** A lead agency must be certified or recertified for the purpose of developing, adopting and implementing elements of the SIP.
-

REQUIREMENTS FOR OZONE PLANS

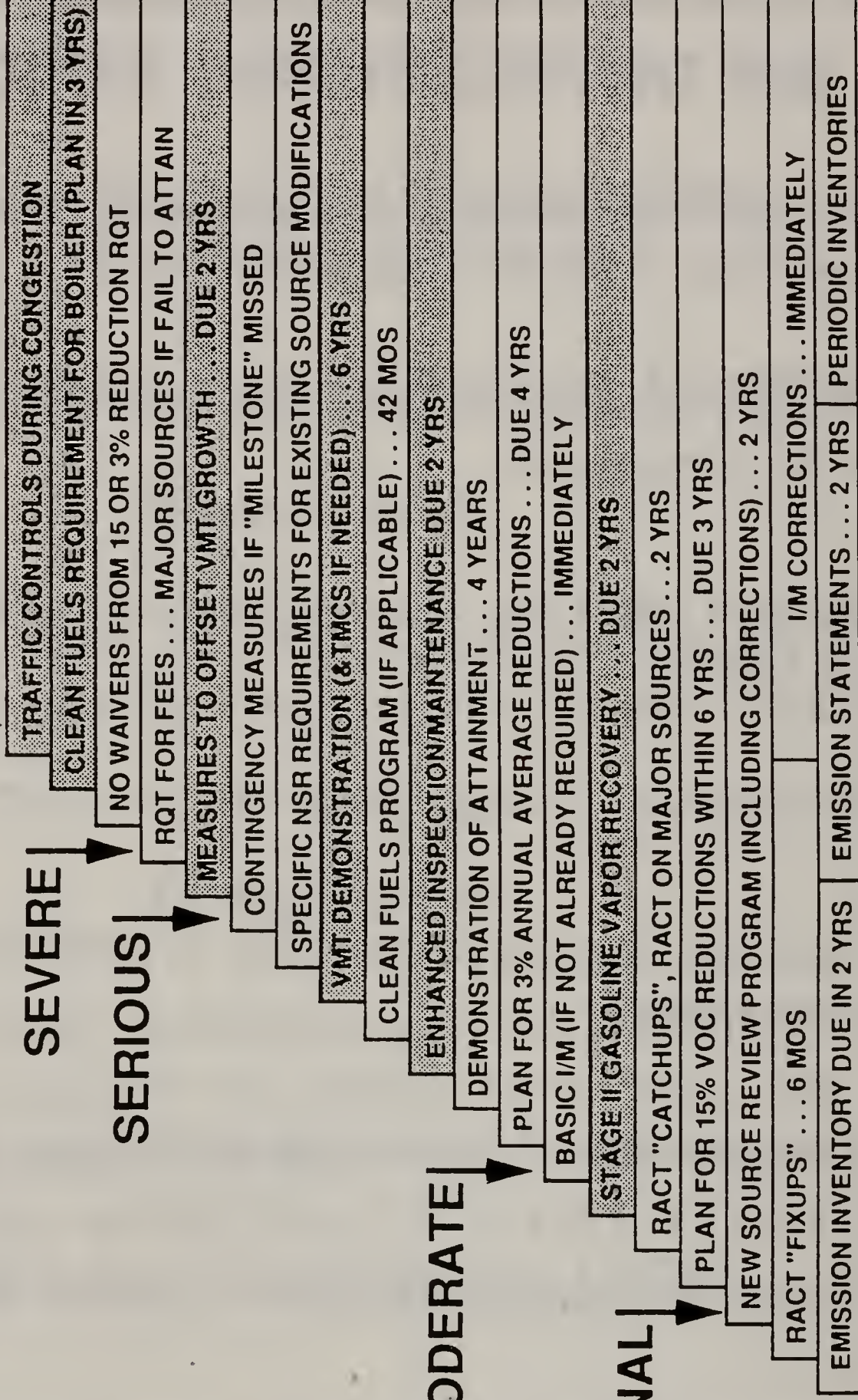
EXTREME

SEVERE

SERIOUS

MODERATE

MARGINAL



SHADING INDICATES ITEMS THAT MAY REQUIRE NEW STATE LEGAL AUTHORITY

SOURCE: U.S. ENVIRONMENTAL PROTECTION AGENCY

REQUIREMENTS FOR CO PLANS

SERIOUS

MODERATE

TCMs IN 2 YRS. TO OFFSET VMT

CLEAN FUEL FLEET PROGRAM (≥ 16.0 PPM)

ATTAINMENT DEMO IN 2 YRS, (>12.7 PPM)

ENHANCED I/M IN 2 YRS. (>12.7 PPM)

CONTINGENCY MEASURES IN 2 YRS. (>12.7 PPM)

VMT FORECASTS & ANNUAL UPDATES (>12.7 PPM)

BASIC I/M, IF NOT PREVIOUSLY REQUIRED

OXYGENATED FUELS... MSA/CMSA

EMISSIONS INVENTORY ... 2 YRS; 3-YR UPDATES

SHADING INDICATES ITEMS
THAT MAY REQUIRE NEW
STATE LEGAL AUTHORITY

SOURCE: U.S. ENVIRONMENTAL PROTECTION AGENCY

Reasonable Available Control Technology

The Clean Air Act of 1990 requires:

All existing NO_x and VOC Sources 50 tons or more must install Reasonably Available Control Technology.

Existing pollution sources subject to these controls include utilities, industries, large facilities including hospitals and maybe even large school boilers.

What does RACT mean?

Reasonably Available Control Technology or RACT is defined as a technology or emission reduction strategy that is available in the market (used in other states or nations) that "reasonable" in terms of cost.

RACT has long been applied to sources of Volatile Organic Compounds where the cost of RACT has been in the \$4,500 - \$6,800 per ton of pollution range.

The state has two choices in complying with RACT requirements of the Clean Air Act. The state can:

1. Develop rules that set a presumptive norm for RACT by source category,
2. Approach each source individually and set a source RACT limit. This latter approach requires single source SIP revisions and can take up to five years to get through the approval process at EPA.

Massachusetts has elected to pursue the first option and is developing RACT rules for a number of source types.

Reasonably Available Control Technology

(cont.)

RACT applies to sources of 50 Tons per year potential emissions. Permit restriction if actual emissions less than 50 Tons per year.

Categories: **Volatile Organic Compounds**- Lithographic Printing, Leather Coating, Wood Products Coating, Plastic Products Coating, Coating Mixing tanks and Bakeries.

Oxides of Nitrogen- Boilers, incinerators, gas turbines, reciprocating engines, jet engine test cells and glass furnaces.

(NOTE: Phase II NO_x reductions - May be required based on Urban Airshed Modeling. Could be SCR, SNCR, 3 way catalyst.)

RACT determined for the source category by 11/92. Compliance is required by 1995 (for NO_x RACT) and 1994 or 1995 (for VOC RACT) depending on compliance method. Source must file a Emission Control Plan and get Department approval

Note on VOC RACT- Sources can obtain a one year deadline extension if they pursue pollution prevention methods of compliance and work with the EOE Office of Technology Assistance or a Toxics Use Reduction Planner to identify feasible reformulation and pollution prevention methods of compliance.

RACT Candidate Rules 50 Tons VOC

Aircraft Fuel Transfer*
Non-Gasoline VOC Transfer*
Barge and Tanker Cleaning
Lithographic Printing*
Pipe Coating
POTW*
Asphalt Batching Plants
Surface Coating Plastic*
Industrial Wastewater Pre-treatment*
Clean-up Solvents*
Surface Coating Wood Products
Paint, Varnish & Coating Manufacture*
Leather Coating
Fabric Finishing and Printing
Paper and Pulp Manufacture
Food Products and Bakeries

*Required by CAAA of '90 for inclusion

RACT Candidate Rules 50 Tons NO_x

Utility Boilers
Large Industrial Boilers
Turbines
Reciprocating Engines
Rotary Dryers (asphalt plants)
Drying Operations
Large Incinerators
Flares
Manufacturing Processes
Process Heaters

Substitution of NOx Reductions for VOCs

(section 182(c)(2)(C))

EPA, in conjunction with the National Academy of Sciences, conducted a study of ozone precursors to determine role of VOC and NOx. Study also examined:

- extent to which NOx reductions are beneficial to attainment in different areas;
- sensitivity of ozone to the control of NOx,
- availability and extent of NOx controls,
- role of biogenic VOC emissions

To be substitutable, must show that NOx and VOC reductions will be at least equivalent to VOC alone.

Applies only after first 15% reductions are made in 1996 in VOC emissions (net of growth).

NOx RACT is required regardless of states finding on substitutability for NOx for VOC.

New Source Review

The Clean Air Act of 1990 requires:

All new sources of NOx and VOC of 50 tons or more, or modifications to existing NOx or VOC Sources of 25 Tons or more are to install Lowest Affordable Emission Reduction (LAER) and offsets. (CO sources in certain communities also subject at an applicability threshold of 100 tons)

What is New Source Review ?

New Source Review (NSR) has been applied for years to sources of VOC and CO. The CAA requires the program be expanded to sources of NOx

NSR will apply to all new VOC and NOx sources of 50 tons or more and CO sources of 100 tons or more located in a CO nonattainment community. NSR also applies to modifications to existing VOC, and NOx Sources of 25 Tons or more (size of the modification) and modifications of CO sources of 100 tons or more.

Sources subject to these requirements must be permitted for BACT, LAER and must offset the anticipate increase in emissions.

New Source Review

(cont.)

New Source Review (310 CMR 7.00 Appendix A) applies to the following sources:

Ozone - NO_x, VOC Major stationary source -

50 Tons per year instead of 100 Tons per year

Major modification - 25 Tons per year over 5 years instead of 40 Tons per year

Carbon monoxide - more cities and towns now in nonattainment (13)

so LAER and Offsets apply here as well

(Specifically Boston, Cambridge, Worcester, Springfield, Lowell, Revere, Everett, Waltham, Quincy, Chelsea, Medford, Malden and Somerville)

Major stationary source - 100 Tons/year

Major modification - 100 Tons per year

Lowest Achievable Emissions Rate (LAER):

(Includes clean fuels)

Offsets - 1.2:1 instead of 1:1. Available offsets are reductions beyond lower of actual emissions, BACT, LAER, RACT or any otherwise required emission reduction under the Act.

Special Offset rules:

Changes at sources greater than 100 TPY potential are subject to NSR and must apply LAER UNLESS they can provide internal offsets and a ratio of 1.3 to 1.

Changes at sources less than 100 TPY potential are subject to NSR and must apply BACT unless they can provide internal offsets at 1.3 to 1.

Emission Offset Requirements

State must demonstrate that offset does not interfere with Reasonable Further Progress

Offset Baseline should be calculated on an actual emission basis

SIP must also be based on actual emissions

Avoid Paper Credits

Provide Real Reductions

For Massachusetts offset must be 120% of new source. This means that any new source (eg. factory, plants) that seeks an air permit after 11/15/92, must be accompanied by specific "offsetting" pollution reductions amounting to 120% of the sources' emissions. The permit may not be issued in the absence of these offsets.

PRINCIPLES FOR EMISSIONS TRADING

1. Any emissions trading program must comply with all applicable state and federal requirements and/or mandates.

All emission reduction credits (ERCs) must be:

real - must be an emission reduction below baseline;

quantifiable - must be able to establish a reliable basis for calculating the amount and rate of the reduction and be able to describe its characteristics;

enforceable - must occur through a mechanism that can be enforced by the state and the EPA Administrator;

surplus - reductions that exceed those reductions required by state control measures contained in the ozone SIP and by other CAA provisions; and

permanent - must be assured for the life of the corresponding increase through an enforceable mechanism.

All trades of ERCs must result in a net environmental benefit.

ERCs can only be created through an approved state and/or federal permit.

Some ERCs' value is of limited duration and must be replaced upon expiration if used for permanent reductions.

Mobile source generated ERCs.

ERCs generated from programs the state intends to adopt for SIP compliance purposes prior to state's implementation date.

2. An emissions trading program must strive for regulatory simplicity.

Regulatory simplicity will encourage participation and use.
Eliminate disincentives to participation and use.

3. An emissions trading program should allow for participation by emission reductions clearinghouses or brokerages.

To facilitate participation in and use of emissions trading program through marketing and coordination of the marketplace.

Title II - Mobile Sources Key Provisions

- Tailpipe Standards
 - Clean Fuels
 - Reformulated Gasoline
 - Volatility Limits
 - Non-road engines
-

MASSACHUSETTS LOW EMISSION VEHICLE (LEV) STANDARDS

WHAT IS REQUIRED UNDER THE LEV STANDARDS?

- The LEV program establishes exhaust emission standards for cars and light duty trucks.
- Beginning with the 1995 model year, engines for passenger cars and light duty trucks must be certified as meeting the emissions rates for one of the following categories:
 1. Standard Vehicles (SV)
 2. Transitional Low Emission Vehicles (TLEV)
 3. Low Emission Vehicles (LEV)
 4. Ultra Low Emission Vehicles (ULEV)
 5. Zero Emission Vehicles (ZEV)
- Starting in 1998 there is a Zero Emission Vehicle (ZEV) sales mandate of 2% of all new vehicle sold in state must be a ZEV, increasing to 10% of all new vehicles sold in 2003.

WHAT IS NOT REQUIRED UNDER THE LEV STANDARDS

- Severely reformulated gasoline (comparable to California Phase II gasoline) is not required, or necessary for compliance with LEV standards or warranty claims.
- Vehicle manufacturers are not required to sell a specific percentage of vehicles complying with each emission category (except for ZEVs).
- Vehicle manufacturers are not required to design and build vehicle using a mandated fuel.

WHY ADOPT THE LEV STANDARDS?

- Massachusetts is "serious" non-attainment for the national health standard for ozone under the Clean Air Act.
- Ozone is a product of volatile organic compound (VOCs) emissions and nitrogen oxide (NOx) emissions interacting in sunlight. Motor vehicles are the largest source of such emissions:
 - 55% of VOC emissions;
 - 45% of NOx emissions; and
 - 76% of CO emissions.

Inspection/Maintenance Program Requirements

Enhanced I/M will be required in serious areas.

Annual High-Tech Programs are required unless the state can show that biennial or de-centralized programs are equally effective.

Most common enhancements will be the addition of purge and pressure testing and on-road checks.

Auto Warranties

Current 5 year/50,000 mile emissions warranty extended to 8 years/80,000 miles for catalytic converter, electronic control unit and on-board diagnostic controls; EPA may add other control devices

All other emission devices on 1995 and later cars will have warranty extension for 2 years/24,000 miles.

Reformulated Gasoline

Required in 9 worst ozone cities as of 1995, other areas can opt-in (Massachusetts has.)

2.0% min. oxygen, averaging allowed
1.0% benzene maximum w/ averaging

15% VOC and toxics reductions from 1990 baseline, 25% by 2000.

Reduction of aromatic compounds as needed to meet toxics standards

No NOx Increase allowed

Anti-deposit detergents must be added to all gasoline nationwide.

Oxygenated Fuels CO Program

Beginning Nov. 1, 1992, all gasoline sold in 41 CO Non-attainment areas must be oxygenated during the winter months.

2.7% oxygen level

EPA can delay program start by up to 2 years for insufficient domestic supply and distribution capacity

Massachusetts has applied for a waiver from EPA and is awaiting approval.

Refueling Controls: Vapor Recovery

STAGE II

Controls evaporation while pumping fuel into individual vehicle gas tanks.

Massachusetts began this program in advance and has nearly completed changes to service stations.

Clean Fleets

- Covers Fleets of 10 or more vehicles that are capable of central fueling
 - Begins in 1998 unless cars meeting these standards are not being sold in California; then would begin in 2001
 - 30% of new fleet purchases must meet Low Emission Vehicle standards (0.075 VOC/3.4 CO, 0.2 NOx) and phases up to 70%.
 - Massachusetts has already adopted the California LEV standards
-

Urban Buses

- Stringent diesel particulate standard (0.1 grams) by 1993
 - Beginning in 1994, all new urban bus fleets must meet a 0.05 PM standard; if found infeasible technically, EPA can re-set to 0.07.
 - If EPA finds that buses in-use are not meeting the 1994 standard, it must implement a "low polluting fuels" program for new buses in large cities.
 - Bus engines replaced or rebuilt in 1995 or later must meet emission standards set by EPA which reflect best retrofit technology achievable.
-

Off-Road Engines

- EPA to control emissions from off-road engines that contribute to urban air pollution
 - EPA to issue regulations requiring the greatest degree of emission reduction achievable for any category of polluting engines
 - Standards to be set for new locomotives by 1995
 - California may regulate more strictly and other states may opt-in to require California-type engines to be sold within their boundaries.
-

Transportation Program Requirements

- Track Vehicle Miles of Travel
 - Examine transportation control measures
 - Evaluate TCMs and adopt if found feasible and effective and include in the 1993 SIP.
 - Adopt TCMs if VMT projections in the SIP are exceeded.
 - Maintain Transportation conformity with the SIP.
-

Transportation Conformity Requirements

Evidence of net reductions in emissions
as a result of TIP

In all cases emission reductions are
to be consistent with target levels
set for "Reasonable Further Progress"
(ie. the reduction levels required
beyond 1996 for areas in the serious
category).

Existing funding and staff resources
must be made available for continued
air quality activities as part of the
planning process.

Transportation Conformity

All transportation plans, programs and federally-assisted projects must conform to the existing SIP. Transportation Plans and programs approved before November 15, 1991 will be able to proceed for 3 years.

Beginning on November 15, 1991: each region must show how their transportation programs conform to the SIP. In regions with explicit targets, the projects programmed for construction must make emissions reductions consistent with those targets.

Transportation Conformity (cont.)

By November 15, 1993

Transportation plans and programs approved after this date must conform with the revised ozone SIP control strategy for mobile source emissions.

Boston Region Transportation Projects Awaiting Inclusion in the SIP as per Central Artery Commitments

Development of a Comprehensive Master
Plan for transit, to include
maximizing use of alternative fuels
and review of overall efficiency of the MBTA

Completion of Washington Street
Replacement Transit (1994)

South Boston Transitway

Circumferential study

New bus terminal at South Station
and at Lynn station

Purchase of new buses (400)
Addition of rolling stock on
the Red and Orange Lines
by the year 2000

Blue Line Platform lengthening/ mod.

Bowdoin-Charles connector

Extension of the Green Line
through Somerville by 2010

Provision of handicapped
access at Andrew Square by 1993

Creation of 11,000 parking
spaces at rapid transit stations

VMT Tracking

1990 actual VMT will form the base

Additional emissions related to post - 1990 VMT will have to be compensated for by reductions of other sources (such as cleaner automobile fuel, cleaner auto exhaust systems, more stringent inspection and repair systems, and cleaner power plants).

Uses Highway Performance Monitoring System, a nation-wide program which samples travel on public non-local roads.

Current VMT forecast uses Massachusetts Highway Department projection of 4% growth/ year.

Air Toxics

EPA promulgating regulations beginning in 1992 for sources which emit at least 189 "hazardous air pollutants"

Applies to smaller sources of 10 tpy.

Title V Operating Permit Program

Used to Implement All Provisions of the Act

Required for All Major Sources:

50 Ton VOC and NO_x Sources

100 Ton SO₂ and Particulate Sources

10 Ton Toxic Sources

Provides for Standard Permit Procedures

EPA Review and Public Petition

Specific Elements Required in Permits:

1) Emission Limits

2) Compliance Plan and Certification

3) Fixed Term

4) Monitoring and Reporting

5) Permit Change or Termination for Cause

6) Operational Flexibility

Title V

Permit and Compliance Fees

CAA Provides for Fees to Cover Cost of Permit Program

Annual Fee must be calculated to be sufficient to cover all costs of administering program (direct and indirect costs)

State must dedicate the funds from fees to cover cost of air program

The state may charge no less than \$25. per ton for each regulated pollutant except CO

4,000 ton per pollutant cap

Federal Sanctions if State Fails to Act or make Required Reductions

- Severe growth limits in non-attainment areas
- Withhold Highway funds
- Withhold State Air Program Grants
- EPA will take over Massachusetts SIP and impose federal implementation plan

New Enforcements Tools

- Citizen Lawsuit Provision greatly strengthened
-

Program Acronyms

- SIP - State Implementation Plan
- PDS - Prevention of Significant Deterioration
- NSR - New Source Review
- NSPS - New Source Performance Standards

Control Technology Acronyms

- BACT - Best Available Control Technology
 - RACT - Reasonably Available Control Technology
 - LAER - Lowest Achievable Emissions Rate
 - BDT - Best Demonstrated Technology
 - MACT - Maximum Available Control Technology
 - GACT - Generally Available Control Technology
-

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A Short Glossary for the Clearing the Air Conference

ACID DEPOSITION ("ACID RAIN") - A complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then deposited on earth in either a wet or dry form. The wet forms, popularly called "acid rain," can fall as rain, snow, or fog. The dry forms are acidic gases or particulates.

AIR POLLUTION CONTROL REGION - An area - designated by the federal government - in which communities share a common air pollution problem.

AIR TOXICS - Any air pollutant for which a national ambient air quality standard (NAAQS) does not exist (i.e. excluding ozone, carbon monoxide, PM-10, sulfur dioxide, nitrogen dioxide) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunctions, neurological disorders, heritable gene mutations or other serious or irreversible chronic or acute health effects in humans.

AMBIENT AIR - Any unconfined portion of the atmosphere; surrounding air, open air.

AREA SOURCE - Any source of non-natural air pollution that is released over an area but which cannot be classified as a point source; ie. pollution from vehicles and other small fuel combustion engines.

AROMATICS - A type of hydrocarbon, such as benzene or toluene, added to gasoline in order to increase octane. Some aromatics are toxic.

ATTAINMENT AREA - An area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

BACT - BEST AVAILABLE CONTROL TECHNOLOGY - An emission limitation based on the maximum degree of emission reduction which is achievable through application of production processes and available methods, systems, and techniques. In no event does BACT allow for emissions greater than the Clean Air Act specifies. Use of BACT is on a case-by-case basis for major new or modified emission sources and applies to each regulated pollutant.

BANKING - A system for recording qualified air emissions for later use in bubble, offset or netting transactions.

BAR - (California) Bureau of Automobile Repair

BAR 74, BAR 80, BAR 84, BAR 90, etc. - Refers to different equipment used for the inspection and Maintenance of automobiles.

BUBBLE - A system under which existing emissions sources can propose alternate means to comply with a set of emissions limitations: under the bubble concept sources can control more than required at one emission point where control costs are relatively low and in return have a comparable relaxation of controls at a second emissions point where costs are higher. (*See emissions trading*)

CARBON MONOXIDE (CO) - A colorless, odorless gas produced by incomplete fossil fuel combustion, which is toxic because of its tendency to reduce the oxygen-carrying capacity of the blood.

CAA - The Clean Air Act (CAAA = Clean Air Act Amendments)

CATALYTIC INCINERATOR - A control device which oxidizes volatile organic compounds (VOCs) by using a catalyst to promote the combustion process. Catalytic incinerators require lower temperatures than conventional thermal incinerators, with resultant fuel and cost savings.

CLEAN FUELS - Blends and/or substitutes for gasoline fuels. These include compressed natural gas, methanol, ethanol, and others.

COLD TEMPERATURE CO - A standard for automobile emissions of carbon monoxide (CO) to be met at a low temperature (i.e., 20 degrees F). Conventional catalytic converters are less efficient upon start-up at low temperatures.

CONFORMITY - Designed to reconcile transportation needs and clean air goals, a determination is now required to show that the state or regional transportation plans, programs and projects are consistent with the purpose of the State Implementation Plan (See SIP). The Clean Air Act Amendments of 1990 forbid federal approval of funding of any project that would cause or contribute to a violation of an air quality standard.

CONTROL TECHNIQUES GUIDELINE (CTG) - Guidance documents issued by EPA which define reasonably available control technology (*see* RACT) to be applied to existing facilities that emit certain threshold quantities of air pollutants; they contain information both on the economic and technological feasibility of available techniques.

CHLOROFLUOROCARBONS (CFCS) - A family of inert, non toxic, and easily-liquefied chemicals used in refrigeration, air conditioning, packaging, insulation, or as solvents or aerosol propellants. Because CFCs are not destroyed in the lower atmosphere they drift into the upper atmosphere where the chlorine is released and destroys ozone.

CFC-12 - A chlorofluorocarbon with a trademark name of Freon, commonly used in refrigeration and automobile air conditioning.

DEP - Massachusetts Department of Environmental Protection, the state agency responsible for managing the air pollution control programs, under the Executive Office of Environmental Affairs.

DIRECTIONALLY-CORRECT STRATEGIES - Strategies that are projected, through quantitative analysis, to achieve air quality benefit, but for which adequate procedures to quantify emission reduction are not definable (i.e., programs intended to motivate public behavioral change, for which quantitative tracking of program results is not feasible).

DYNAMOMETER - A tread-mill like device which applies a simulated road load to a vehicle's drive wheels with the vehicle standing still.

EMISSION CONTROL DIAGNOSTICS - Computerized devices placed on vehicles to detect malfunction of emissions controls and notify the owner of the need for repair.

EMISSIONS INVENTORY - The quantification of all criteria pollutant emissions from all sources, prepared by the state.

EMISSIONS TRADING - An emissions-limiting incentive program which is based upon the creation of a market in which trading of total emissions limits may occur.

ENHANCED INSPECTION & MAINTENANCE (ENHANCED I/M). - An improved automobile inspection and maintenance program that includes, as a minimum, increases in coverage of vehicle types and model years, tighter stringency of inspections and improved management practices to ensure more

effectiveness. This may also include annual, computerized, or centralized inspections; under-the-hood inspections to detect tampering with pollution control equipment; and increased repair waiver cost. The purpose of Enhanced I/M is to reduce automobile emissions by assuring that cars are running properly.

EPA - United States Environmental Protection Agency

EVAPORATIVE EMISSIONS - Gasoline fumes which escape through leaks or malfunction from fuel lines, carburetors and emissions control systems; also produced by fumes escaping during refueling, can occur whether the vehicle is operating or not; most prevalent when air temperature is high.

FEDERAL IMPLEMENTATION PLAN (FIP) - Under the law, a federally implemented plan to achieve attainment of an air quality standard, used when a state is unable to develop an adequate plan. A plan containing control measures will be developed and promulgated by EPA in order to fill gaps in a State Implementation Plan (SIP).

GASOLINE VOLATILITY - The property of gasoline whereby it evaporates into a vapor. Gasoline volatility is measured in pounds per square inch (psi), with a higher number reflecting more gasoline evaporation. Gasoline vapor is a volatile organic compound (VOC).

HALONS - A family of compounds containing bromine used in fighting fires, whose breakdown in the atmosphere depletes stratospheric ozone.

HCFCs - Chlorofluorocarbons that have been chemically altered by the addition of hydrogen, and which are significantly less damaging to stratospheric ozone than other CFCs.

I/M - INSPECTION & MAINTENANCE - A program providing for periodic inspections of motor vehicles to ensure that emissions of specified pollutants are not exceeding established limitations.

LAER - Lowest Achievable Emission Rate: The rate of emissions which reflects: 1) the most stringent emission limitation which is contained in the implementation plan of any state for a given pollution source, or 2) the most stringent emission limitation achieved in practice, whichever is more stringent.

LEV - Low emitting Vehicles, as defined by the State of California

LOW NO_x BURNERS - One of several combustion technologies used to reduce emissions of NO_x.

MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY (MACT) - Emissions limitations based on the best demonstrated control technology or practices in similar sources to be applied to major sources emitting one or more of the listed toxic pollutants.

MARKET - BASED STRATEGIES - Pollution reduction approaches that create one or more incentives for polluters to reduce emissions without directly specifying limits. Such programs rely on market forces as an alternate means of compliance to reduce the cost of meeting program requirements. Inherent in such programs is the consequence that actual emissions collectively will necessarily achieve the specified emission limits in the aggregate, across all sources.

MOBILE SOURCES - Pollution attributed to transportation sources such as automobiles, trucks, motorcycles, buses, etc.

MOBILE 4.1 - EPA's approved computer model which calculates vehicle emission factors, in grams per mile based on a variety of variables including speed, temperature, age of vehicle, etc.

MONTREAL PROTOCOL - An international environmental agreement to control chemicals that deplete the ozone layer. The protocol, which was re negotiated in June 1990, calls for a phase-out of CFCs, halons, and carbon tetrachloride by the year 2000, a phase-out of chloroform by 2005, and provides financial assistance to help developing countries make the transition from ozone-depleting substances.

MPO - Metropolitan Planning Organization; the regional transportation entity responsible for developing and approving intermodal transportation plans and providing regional approval to allocate federal transportation funding .

NAAQS - National Ambient Air Quality Standards

NESCAUM - Northeast States for Coordinated Air Use Management, a research and advocacy organization of northeast states air pollution professionals (and an organizer of this conference).

NEW SOURCE REVIEW - The program for pre-construction review of new major stationary sources and major modifications of existing stationary sources under nonattainment requirements

NONATTAINMENT STATUS - A geographic area that doesn't meet the National Ambient Air Quality Standards for any criteria pollutant.

NO_x (NITROGEN OXIDES) - Chemical compounds containing nitrogen and oxygen; reacts with volatile organic compounds, in the presence of heat and sunlight to form ozone. It is also a major precursor to acid rain. Nationwide, approximately 45 percent of NO_x emissions come from mobile sources, 35 percent from electric utilities, and 15 percent from industrial fuel combustion.

OFFSETS - A required program under the New Source Review program in the CAA for major new stationary sources and major modification in nonattainment areas, in which the new or expanding facilities secures emission reduction credits either from other facilities in the area or from within the same facility sufficient to offset the increase in emissions projected to occur.

OTC - The Ozone Transport Commission, established by the Clean Air Act Amendments of 1990 to address the daily movement of ozone across state boundaries in the 13 states along the eastern seaboard from northern Virginia to Maine.

OXYGENATED FUELS - Gasoline which has been blended with alcohols or ethers that contain oxygen in order to reduce carbon monoxide and other emissions.

OZONE - A compound consisting of three oxygen atoms, that is the primary constituent of smog. It is formed through chemical reactions in the atmosphere involving volatile organic compounds, nitrogen oxides, and sunlight. Ozone can initiate damage to the lungs as well as damage to trees, crops, and materials. **NOTE:** There is a common misunderstanding regarding ozone. Ground-level ozone is harmful to humans, animals, plants and materials, however, stratospheric ozone is beneficial. There is a natural layer of ozone in the upper atmosphere which shields the earth from harmful ultraviolet radiation. This layer of ozone is being depleted by chlorofluorocarbons; used as propellants in aerosols sprays and as coolants in air conditioners and refrigerators. The result has been "ozone holes" that are being studied by scientists worldwide.

PM-10 - Small particles of airborne dust, metal, liquids and other materials suspended in the atmosphere ("particulate matter"). Refers to particulate matter over 10 micrometers in diameter. The smaller PM-10 particles penetrate to the deeper portions of the lung, affecting sensitive population groups such as children and people with respiratory diseases.

RACM - REASONABLY AVAILABLE CONTROL MEASURES - A broadly defined term referring to technologies and other measures that can be used to control pollution; includes Reasonably Available Control Technology and other measures. In the case of PM-10, it refers to approaches for controlling small or dispersed source categories such as road dust, woodstoves, and open burning.

RACT - REASONABLY AVAILABLE CONTROL TECHNOLOGY - An emission limitation on existing sources in non-attainment areas, defined by EPA and adopted and implemented by States. Until November 15, 1992, RACT requirements were applied to sources of 100 tons per year or more of a criteria pollutant. After that date in "serious" nonattainment areas, such as Massachusetts, sources emitting 50 tons per year will be subject to these requirements.

REFORMULATED GASOLINE - Gasoline with a different composition from conventional gasoline (e.g., lower aromatics content) and that results in the production of lower levels of air pollutants.

REPOWERING - The replacement of an existing coal-fired boiler with one or more clean coal technologies, in order to achieve significantly greater emission reduction relative to the performance of technology in widespread use as of the enactment of the Clean Air Act amendments.

SANCTIONS - Actions taken against a state or local government by the Federal government for failure to plan or to implement a SIP. Examples include withholding of highway funds and a ban on construction of new sources.

STAGE II CONTROLS - Systems placed on service station gasoline pumps to control and capture gasoline vapors during automobile refueling.

STATE IMPLEMENTATION PLAN (SIP) - Document prepared each state, and submitted by the Governor or designee to EPA for approval, which identifies actions and programs to be undertaken by the State and its subdivisions to implement their responsibilities under the Clean Air Act. Commitments in SIPs are legally enforceable.

STATIONARY SOURCES - A pollutant emitter which is immobile, usually a smoke stack or chimney. This category includes power plants and manufacturing facilities.

SULFUR DIOXIDE (SO₂) - A heavy, pungent, colorless air pollutant formed primarily by the combustion of fossil fuels. It is a respiratory irritant, especially for asthmatics and is the major precursor to the formation of acid rain.

TRANSPORTATION CONTROL MEASURES (TCMs) - Steps taken by a locality to adjust traffic patterns (e.g., bus lanes, right turn on red) or reduce vehicle use (ridesharing, high-occupancy vehicle lanes) to reduce vehicular emissions of air pollutants.

VEHICLE MILES OF TRAVEL (VMT) - A measure of both the volume of motor vehicle operation; the total number of vehicle miles travelled within a specified geographical area over a given period of time.

VOLATILE ORGANIC COMPOUNDS (VOCs) - A group of chemicals that react in the atmosphere with nitrogen oxides in the presence of heat and sunlight to form ozone; does not include methane and other compounds determined by EPA to have negligible photochemical reactivity. Examples of VOCs include gasoline fumes and oil-based paints.

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